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VORSTAB - A COMPUTER PROGRAM FOR CALCULATING LATERAL-DIRECTIONAL STABILITY DERIVATIVES WITH VORTEX FLOW EFFECT

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TABLE OF CONTENTS

INTRODUCTION

This report describes the usage of a computer program for calculating lateral-directional stability and control derivatives as described in reference 1. The method is applicable to wing-body combinations in subsonic flow.

In the following, a summary of the theoretical method, program capabilities, input format, output variables and program job control set-up are described. Then, input data of sample test cases and the corresponding output are given. The program listing is presented at the end.

SUMMARY OF THE THEORETICAL METHOD

The method is based on the Prandtl-Glauert equation in subsonic flow. The wing is assumed to be thin, so that thickness effect is not included. In the following, theoretical representation of the effects of wings, vortex flow and fuselage is summarized. Note that the effect of boundary layer separation is not accounted for. The wing wake is assumed to be flat.

(1) Wing Representation

The wing effect is represented by using a vortex distribution. The resulting integral equation for the wing surface boundary condition (i.e. flow tangency) is solved through the Quasi-Vortex-Lattice Method (QVLM) (ref. 2). The solution of the equation is the spanwise vortex density (γ_y) which is used to obtain the loading under symmetrical flight conditions. In addition, by calculating the net upwash along the leading edge using the predicted γ_y distribution,

the leading-edge thrust can also be calculated (ref. 2). Note that the leading-edge thrust is parallel to the plane of symmetry and is a component of the leading-edge suction. The latter is perpendicular to the leading edge. For a cambered wing, the relation between the leading-edge thrust and suction can be found in reference 3.

For the calculation of side-edge suction and lateral-directional characteristics, the most important quantity needed is the streamwise vortex density (γ_x). It is calculated by satisfying the conservation of vorticity,

$$\frac{\partial \gamma_x}{\partial x} + \frac{\partial \gamma_y}{\partial y} = 0 \qquad (1)$$

In much the same way as using γ_y to calculate the longitudinal characteristics, both γ_y and γ_x are used to calculate the lateral-directional loading (refs. 1 and 2).

For a steady rolling wing, the viscous boundary layer tends to flow toward the wing tips, so that the effective overall angle of attack is reduced. In the program, an approximate method based on the boundary layer thickness of a rotating disk is used to estimate this reduction in angle of attack(ref. 1).

(2) Vortex Flow

To account for the effect of edge-separated vortex flow, Polhamus' method of the suction analogy (ref. 4) is extended to include the lateral-directional motion. In addition, the following features are also incorporated in the code.

(a) Augmented vortex lift effect.

For wings with a nonzero tip chord or with swept

trailing edges, the leading-edge vortex may pass over an additional (or less) planform area before reaching the wake. The vortex lift induced on the downstream planform area is called the augmented vortex lift (ref. 5)

(b) Strake Vortex

A strake vortex not only produces the augmented vortex lift, but also induces downwash inboard and upwash outboard of the strake-wing juncture. To account for this effect, a discrete vortex starting from the juncture to downstream infinity is introduced. The strength of this discrete vortex is calculated by equating the vortex lift to the Kutta-Joukowski force:

$$\tfrac{1}{2}\rho V_\infty^2 c_s c \, dy = \rho \Gamma w_{\ell e} d\ell \qquad (2)$$

where c_s is the sectional leading-edge suction coefficient, Γ is the equivalent circulation per unit length of the leading edge, $w_{\ell e}$ is the upwash at the leading edge and ℓ is the length measured along the leading edge. The total circulation or the vortex strength is then

$$\Gamma_t = \int_{\ell e} \frac{\Gamma}{V_\infty} d\ell = \tfrac{1}{2} \int_{\ell e} \frac{c_s c}{\left.\frac{w}{V_\infty}\right|_{\ell.e.}} dy \qquad (3)$$

Since both c_s and $w_{\ell.e.}$ depend on Γ_t, the circulation is determined iteratively.

(c) Vortex lift on wings with rounded leading edges

The vortex lift on a wing with rounded leading edges is known to have a value less than that with sharp edges. The method used to estimate the reduced vortex lift in the code is based on Kulfan's concept

(refs. 6 and 7). In the latter, the sectional angle of attack (α_s) at which the vortex separation first occurs is calculated by equating the leading-edge thrust to the leading-edge drag. For a symmetrical wing, the result is (ref. 1)

$$\alpha_s = \sin^{-1}\left\{\pm \frac{\sin\alpha}{C'}\left(\frac{2r_o}{c}\right)^{\frac{1}{2}} \frac{\cos\Lambda_\ell}{(1-M_\infty^2\cos^2\Lambda_\ell)^{\frac{1}{2}}}\right\} \tag{4}$$

where C' is the leading-edge singularity parameter at α given by

$$C' = \lim_{x\to x_\ell} \gamma_y \left(\frac{x-x_\ell}{c}\right)^{\frac{1}{2}} \tag{5}$$

and r_o is the leading-edge radius.

For a cambered wing, equation (4) is revised to be

$$\alpha_s = \sin^{-1}\left\{\pm \frac{\sin\alpha+\alpha_1}{C'}\left(\frac{2r_o}{c}\right)^{\frac{1}{2}} \frac{\cos\Lambda_\ell}{\sqrt{1-M_\infty^2\cos^2\Lambda_\ell}} - \alpha_1\right\} \tag{6}$$

where α_1 appears in the expression for leading-edge suction (c_s) as follows

$$c_s = K\,[\sin\alpha+\alpha_1]^2 \tag{7}$$

where K is a function of geometry and Mach number. If c_s' is the leading-edge suction coefficient for the corresponding noncambered wing, then α_1 can be calculated as

$$\alpha_1 = \left(\sqrt{\frac{c_s}{c_s'}} - 1\right)\sin\alpha \tag{8}$$

(d) Vortex Breakdown

To predict the vortex breakdown effect, it is necessary to have the following information:

(1) the angle of attack for vortex breakdown at the trailing edge (α_{BD}) for any planforms;

(2) the progression of the breakdown point when $\alpha > \alpha_{BD}$;

(3) the amount of remaining vortex lift in the region of breakdown.

In the present method, the calculated leading-edge suction distribution ($c_s c$) is used to correlate with the experimental data of Wentz (ref. 8) for the needed information mentioned above.

(3) Body Representation

The influence of fuselage on the flow field is represented by Ward's vortex multiplets (ref. 9) distributed along the fuselage centerline. Although the method is applicable to arbitrary body cross sections, it has been implemented only for bodies of revolution with any radius variation. However, the wing-body interference has been properly accounted for.

PROGRAM CAPABILITIES

This program has the following main features:

(1) It is applicable to nonplanar wing configurations in subsonic flow, including winglets, vertical fins, etc. The leading and trailing edges may be curved. Up to six (6) lifting surfaces can be accepted. For wings with dihedral, they may be represented by up to five (5) contiguous spanwise panels with different dihedral angles.

(2) It is also applicable to an asymmetrical configuration. Typical applications involve nonsymmetrical flap or aileron deflections.

(3) General camber shapes may be defined at ten (10) or less spanwise stations. Option for exactly defining leading-edge flap geometry is also provided.

(4) The twist distribution on lifting surfaces can be prescribed in a general way.

(5) Nine (9) lateral-directional stability derivatives are calculated for both attached flow and vortex flow. For the latter, the effect of vortex breakdown is accounted for by an empirical method.

(6) The control effectiveness for both longitudinal and later-directional motions can be calculated.

(7) Ground effect under static conditions can also be calculated.

INPUT DATA FORMAT

Group 1 Format (13A6), 1 card

Title (I) A descriptive phrase describing the case to be run.

Group 2 Format 4(6X,I4), 1 card

NCASE User's specified case number which may be arbitrary.

NGRD = 1 if the wings are in ground effect.

= 0 if the wings are in free air.

NASYM = 0 if the planform is symmetrical about X-Z plane.

= 1 if the planform is not symmetrical about X-Z plane.

In this case, only one lifting surface without winglets is allowed, and the whole planform must be defined, starting from the left tip.

NSUR Number of lifting surfaces, such as wing, canard, tails, etc. Limited to 6. Note. Winglets are not separate lifting surfaces.

Group 3 Format 4(6X,I4), 1 card

LAT = -1 if the rolling moment coefficient for a given aileron angle is to be computed.

= 0 for symmetrical loading only

= 1 if both symmetrical loading and lateral-directional derivatives are to be computed.

For asymmetrical configurations (i.e., NASYM = 1), set LAT = 0. The resulting rolling and yawing moments are computed.

IBLC = 1, if a boundary layer correction is to be applied to roll derivatives.

= 0, if no boundary layer correction is applied.

KT = 1, if the effect of rounded leading edges on vortex lift is calculated.

= 0, if full vortex lift effect is allowed.

IBD = 1, if the vortex breakdown effect is included in calculating vortex lift.

= 0, otherwise.

Groups 4 through 18 must be repeated NSUR times. The wing is the 1st surface.

Group 4 Format 8(6X,I4)

NC Number of spanwise sections on the right wing (bounded by points of discontinuities in geometry, such as change in sweep, edges of flap segments, panels with different dihedral angles, etc.) Limited to 5. (see Sketch 1).

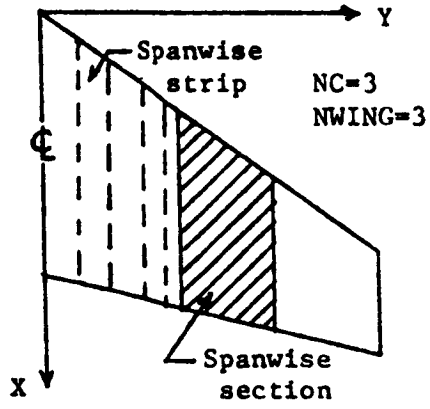
M1(I), I=1, NC Number of spanwise strips in each spanwise section. There are NC numbers. Maximum total number of strips is 48. (See Sketch 1). A minimum of 2 should be used in each section.

NWING The numerical value of last wing spanwise section, i.e., its most outboard section.

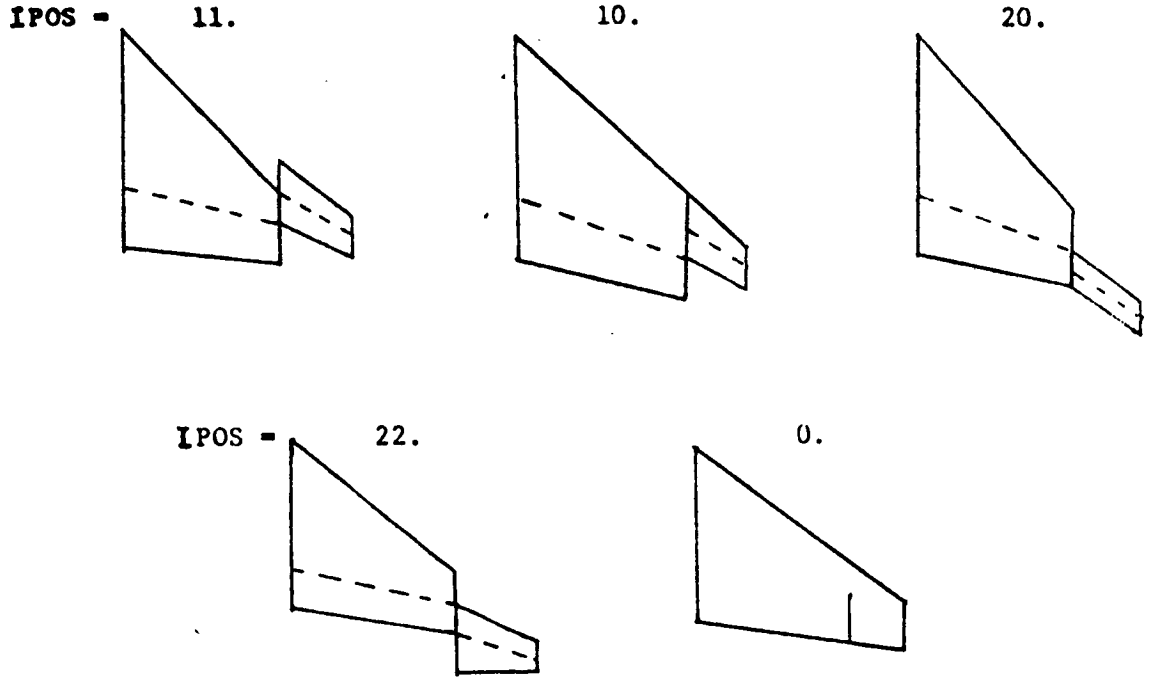
IWGLT = 1 if a winglet is present. = 2 if a vertical fin is present inboard of wing tip. = 0, otherwise. (Winglet or vertical Fin must be on the wing)

IPOS Winglet position indicator. The number used to identify the configuration in the code is based on whether the winglet is attached to the wing first or second chordwise section, respectively. It is indicated in sketch 2. If there is no winglet, it should be 0.

Note. For coplanar lifting surfaces, such as a coplanar wing-tail configuration, spanwise sections on both upstream and downstream surfaces must line up and numbers of spanwise strips in the corresponding spanwise sections must be the same. This is to avoid trailing vortices from passing over control points on the downstream surfaces.



Sketch 1.



Sketch 2

Group 5 Format 8(6X,I4)

NFP Number of trailing-edge flap segments. Limited to 5.

NJW(I), I=1, NFP Numerical value of the spanwise section in which the trailing-edge flap segment is contained. For either clean or full-span flap configurations, set NFP=1 and NJW (1) = 1. (See Sketch 3).

NVRTX The spanwise strip number on a lifting surface, cumulative from its center line, at which and outboard of which the leading-edge vortex lift effect is not included. Full vortex lift effect is assumed if this value is set to zero.

MVRTX The spanwise strip number on a lifting surface, cummulative from its center line, at which and inboard of which the L.E. vortex lift effect is not included.

NLEF = 1, if the flaps are flat leading-edge flaps.
= 0, if the flaps are trailing-edge flaps.

IV = 1, if the lifting surface has dihedral of 90-deg. and is situated on the plane of symmetry.
= 0, otherwise.

NAL Numerical value of the aileron segment among the trailing-edge flap segments. For a all-movable surface for lateral control, NW(2) should be 0 for that surface (See Group 7).

Group 6 Format 8F10.6, 1 card

DF(I), I = 1, NFP Trailing-edge flap angles in degrees, inboard trailing-edge flap segment first. For leading-edge flaps, the angles are negative for nose down.(See Note 1).*

Group 7 Format 5(6X,I4), 1 card

NW(1) Numbers of chordwise aerodynamic panels in chordwise sections

NW(2) (See Sketch 3). The chordwise section may be bounded along

* Notes appear at the end of this Section.

trailing-edge flap hinge line or winglet leading edge. NW(2) = 0 for clean configurations. (NW(1) + NW(2) is limited to 15. Use at least 8 for NW(1) + NW(2) for cambered sections.

ICAM = 0 for non-cambered airfoils

= 1 if camber ordinates are to be read in.

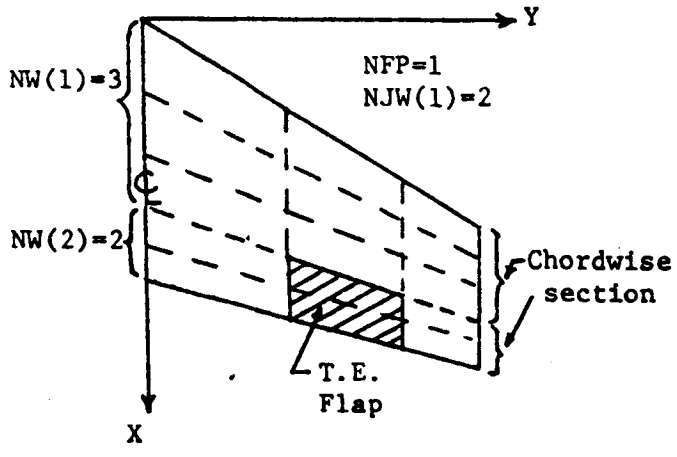
= 2 if camber slopes are defined analytically in subroutine ZCDX.

= 3 if there are flat leading-edge flaps attached to a non-cambered wing.

IST Number of y stations at which camber ordinates are read in. Limited to 10. If ICAM = 3, IST is the number of leading-edge flap segments. If ICAM = 1, at least 2 y-stations are needed, to cover each surface, one at the root and the other at the tip.

ICAMT Numerical value of the y-station at which and beyond which the input cambers are for the winglet or vertical fin.

= 0 if there is no camber for the winglet or fin.



Sketch 3

Omit Groups 8, 9, and 10 if ICAM ≠ 1. Repeat Groups 8, 9, 10 IST times.

Group 8 Format 4F10.6

YT(I) y-station (dimensional) at which camber ordinates are read in.

XNUM number of camber ordinates to be read in. Limited to 21.

CURV(I) = 0. if camber is to be formed by connecting straight segments, with first segment being regarded as flat leading-edge flap.

= 1. if cubic spline interpolation is used.

= 2. if cubic spline interpolation is used, with first segment being flat leading edge flap.

CHND(I) Chord length at YT(I) station.

Group 9 Format 8F10.6

XT(I,J) x/c-values at which camber ordinates are read in for YT(I) station.

Group 10 Format 8F10.6

CA(J) z/c-values of camber ordinates at the corresponding XT(I,J)-locations. (See Note 2).

Omit Groups 11, 12 and 13 if ICAM ≠ 3. Repeat IST times.

Group 11 Format 2F10.6 (See Note 3).

YLEF (I,1) Extreme inboard y-coordinate of Ith flat leading-edge flap segment.

YLEF (I,2) Extreme outboard y-coordinate of Ith flat leading-edge flap segment.

Group 12 Format 6F10.6

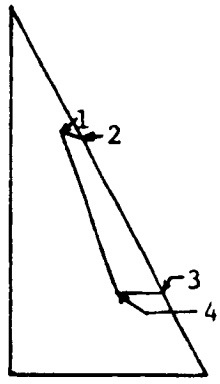
XLF(I,1), YLF(I,1), Z1 — First corner point coordinates of Ith flat leading-edge flap segment. See sketch 4.

XLF(I,2)
YLF(I,2)
Z2
} Second corner point coordinates of Ith flat leading-edge flap segment.

Group 13 Format 6F10.6

XLF(I,3)
YLF(I,3)
Z3
} Third corner point coordinates of Ith flat leading-edge flap segment.

XLF(I,4)
YLF(I,4)
Z4
} Fourth corner point coordinates of Ith flat leading-edge flap segment.



Sketch 4

Note: The flat flap must be inside the boundary of planform described in Group 15.

Repeat Groups 14-18 "NC" times.

Group 14 Format 6X,I4

IPN = 1 if the shapes of L.E. and T.E. are to be defined numerically.
= 0 otherwise.

Group 15 Format 8F10.6

Corner-point coordinates of a spanwise section. See sketch 5a.

XXL(1) L. E. X-coordinate of the inboard chord.

XXT(1) T. E. X-coordinate of the inboard chord.

YL(1) Y-coordinate of the inboard chord.

XXL(2) L. E. X-coordinate of the outboard chord.

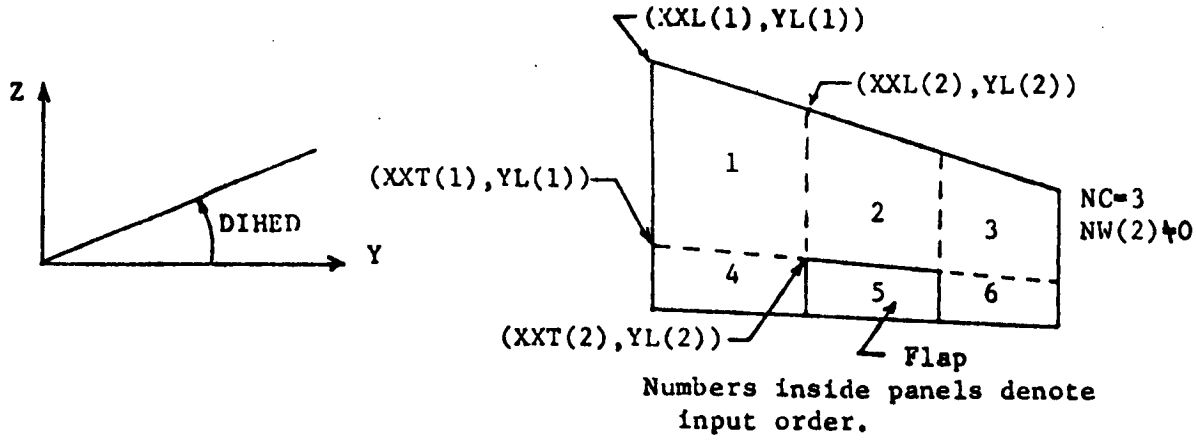
XXT(2) T. E. X-coordinate of the outboard chord.

YL(2) Y-Coordinate of the outboard chord.

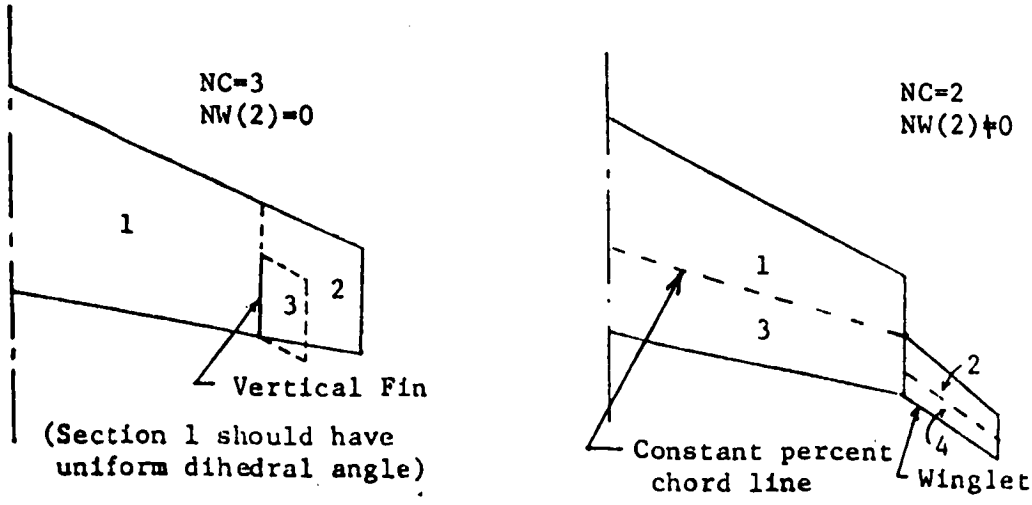
ZS elevation of root chord of the lifting surface relative to fuselage centerline.

DIHED dihedral angle in degrees for the section. For NASYM = 1, DIHED for the left wing is negative upwards.

Note. Groups 14 through 18 are to be repeated NC times. With trailing-edge flaps or winglet, another NC cards are needed to describe the flap and the associated regions. The order of input is illustrated in Sketch 5. Panels with dihedral must be rotated to X-Y plane for geometric description.



Sketch 5 a.



Sketch 5 b.

Groups 16 - 18 must be omitted if IPN = 0.

Group 16 Format 4(6X,I4)

NLE Number of input points to define the leading edge. Limited to 15.

NTE Number of input points to define the trailing edge. Limited to 15.

MCVL = 1 if the cubic spline is used to interpolate the L.E. shape.
= 0 if straight segments are assumed.

MCVT = 1 if the cubic spline is used to interpolate the T.E. shape.
= 0 if straight segments are assumed.

Group 17 Format 8F10.6

CA(I), I=1, NLE X-coordinates of input points to define the LE shape, measured relative to the LE of inboard chord.

YSL(I),I=1, NLE Y-coordinates of input points to define the LE shape, measured relative to the inboard chord. (See Note 4).

Group 18 Format 8F10.6

CA(I), I=1, NTE X-coordinates of input points to define the TE shape, measured relative to the TE of inboard chord.

YST(I), I=1, NTE Y-coordinates of input points to define the TE shape, measured relative to the inboard chord.

↑ REPEAT NSUR TIMES

Group 19 Format 6F10.6

AM Freestream Mach number < 1.0

HALFSW Half of reference wing area, same units as (CREF) squared.
For asymmetrical configurations (i.e., NASYM = 1), use total area.

CREF Reference chord length

BREF2 Reference half span

XREF x-coordinate of moment reference point.

ALPCON = 1. if C_{L_α} and C_{m_α} are to be computed. For this case, set T.E. flap angles to zero. Calculation is done at α = 1 radian.
= 2, if the calculation is for one design lift coefficient based

on the attached-flow theory, = 3, if it is based on the vortex flow theory.

= 0, otherwise.

Group 20 Format 4F10.6, 1 card

(Set the following variables to 0, If ALPCON = 1.)

ALNM Number of angles of attack to be processed. If ICAM $\neq$ 0 and IBD = 1, set ALNM $\geq$ 2. Limited to 15.

SNUM Number of spanwise stations involving augmented vortex lift.

DVRTX =1, if an additional discrete strake vortex is needed to calculate the augmented vortex lift effect.

= 0, otherwise

CLDS = design lift coefficient if ALPCON = 2 or 3.

= 0, otherwise.

If ALPCON = 1., skip Group 21.

Group 21 Format 8F10.6

ALPA(I) Angles of attack in degrees. ALNM numbers. If there are camber, leading-edge flaps, and/or rounded leading edges, start with a high value of angles (such as 35-40 deg.).

Repeat Group 22 SNUM times. If SNUM = 0, use one blank card.

Group 22 Format 7F10.6

SNI Spanwise strip number, cumulative from the center line of the first lifting surface, starting from which the leading-edge vortex produces the vortex lift augmentation on a downstream surface. = 0. if there is no vortex lift augmentation.

SNE Ending spanwise strip number for vortex lift augmentation. = 0. if there is no vortex lift augmentation.

CTILT Characteristic length for augmented vortex lift effect. It may be positive or negative. (See Note 5).

SLETH L.E. length of the lifting surface which produces the vortex lift augmentation.

XCNTD X-coordinate of the assumed centroid of augmented vortex lift.

YCNTD Y-coordinate of the centroid of augmented vortex lift.

XTILT X-distance from the outboard L.E. of the originating surface to the T.E. of the receiving surface over which the vortex is assumed to pass. (See Note 5).

SR The lifting surface number receiving the augmented vortex lift effect.

Groups 23 through 28 are repeated NSUR times. Omit Groups 23 and 24 if KT=0.

Group 23 Format (6X,I4), 1 card

ICNLE = 0 for constant L.E. radius/local chord ratio.

= 1 for constant L.E. radius.

= 2 for variable L.E. radius/chord ratio.

Group 24 Format 8F10.6

RC = L.E. radius/local chord if ICNLE = 0.

= L.E. radius if ICNLE = 1

= L.E. radius/local chord, if ICNLE = 2, at all spanwise control stations.

If ALPCON = 1., Groups 25 - 28 should be omitted.

Group 25 Format 3F10.6

TWST = 1. if there is geometric twist.

= 0. otherwise.

RINC Incidence angle, in degrees, of the lifting surface.

TINP Incidence angle, in degrees, of winglet or vertical fin, relative to the root of the lifting surface.

Groups 26 through 28 should be omitted if TWST = 0.

Group 26 Format 2F10.6

YNUM Number of y-stations to be used to describe twist distribution.

TCURV = 0. if the twist distribution is assumed to have piecewise linear variation.

= 1. if cubic spline interpolation is used.

Group 27 Format 8F10.6

YTS(I) Nondimensional (based on semispan) y coordinates at which twist angles are defined. YNUM numbers. Limited to 21.

Group 28 Format 8F10.6

CA(I) Twist angles in degrees at the corresponding y-stations. Negative for washout (i.e., leading-edge down).

Group 29 Format 2F10.6

HEIGHT Height of 3/4 chord point of mean geometric chord from ground if NGRD = 1.

= 0., otherwise.

ATT = Pitch attitude angle of wings, in degrees.

= 0. if NGRD = 0.

Group 30 must be omitted if LAT ≠ 1.

Group 30 Format 4F10.6

P = $pb/2V_\infty$, the maximum roll helical angle in radian.

BK Sideslip angle in radian.

RL = $rb/2V_\infty$, the yaw rate parameter, in radian. If RL = 0, then $pb/2V_\infty = P \cos(\alpha)$ and $rb/2V_\infty = P \sin(\alpha)$.

CFF Skin friction coefficient based on mean geometric chord, if IBLC = 1.

=0. otherwise.

PBK = 1. if roll derivatives in combination with sideslip are to be computed. = 0. otherwise.

Group 31 Format 4(6X,I4)

KF = 1 if a fuselage is present

= 0 otherwise

NT number of Fourier-series terms, excluding the zero-order term, to satisfy the body surface boundary condition. Usually, 2 or 3 will be sufficient.

NCUM number of circumferential locations on the body surface at which the pressure loading is to be computed. For midwing configurations, use even number. Limited to 10.

NF number of control stations along the fuselage axis. Limited to 20.

Group 32 Format 5F10.6

XAS(1) X-coordinate of the fuselage nose.

XAS(2) X-coordinate of the fuselage tail.

FUSIND = 0. if the fuselage geometry is to be defined analytically in Functions FUR(X) and SLOP(X) (i.e. r(x) and r(x) $\frac{dr(x)}{dx}$ respectively).

= 1. otherwise.

FUSNO number of fuselage stations to be input to define the fuselage shape if FUSIND = 1. Limited to 21.

= 0. otherwise.

FSHAP = 1. if the input fuselage shape is to be interpolated through cubic spline interpolation.

= 0. if the input points for the fuselage shape are connected with straight segments.

= arbitrary if FUSIND = 0.

X1 the body station in fraction of body length at which the rate of change of cross-sectional area with body length first reaches max. negative value. See Datcom.

Groups 33, 34 must be omitted if FUSIND = 0

Group 33 8F10.6

XFF(I) X-coordinates of fuselage to input its radius. FUSNO numbers.

Group 34 8F10.6

RFF(I) radii of fuselage at XFF(I) stations.

* To run additional cases, repeat Groups 1 - 34 *

Note: Total number of unknowns to be solved in the program

$$= \sum^{NSUR} [(\Sigma M1(I)) * (NW(1) + NW(2))] + NF*NT$$

An example of calculating total number of unknowns is given on page 61.

Notes

1. For ailerons, only those on the right wing are prescribed. Antisymmetrical deflection is assumed. Downward deflection is positive. For rudders with conventional positive deflections (i.e. deflected to the left), the input angles must be negative.

   For flap angles given normal to a hinge line, they must be converted to those measured in the streamwise direction for input as "DF". The conversion relation can be derived by vector analysis and is given as follows:

$$\sin\delta_s = \sin\delta_n \cos \Lambda \tag{9}$$

   where δ_s is the flap angle measured in the streamwise direction, δ_n is that normal to the hinge line and Λ is the sweep angle of the hinge line.

2. For a conical camber, a useful mathematical description of the shape can be found in Appendix B of reference 3.

   Equal spacing of input points is the best if cubic spline is to be used for interpolation.

3. For a plane flap, a useful exact description of its geometry and deflection can be found in Appendix B of reference 3. It can be described by the following equation

$$ax + by + cz + d = 0 \tag{10}$$

   where

$$a = (y_4 - y_1)\ (z_3 - z_2) - (y_3 - y_2)\ (z_4 - z_1)$$

$$b = (x_3 - x_2)\ (z_4 - z_1) - (x_4 - x_1)\ (z_3 - z_2)$$

$$c = (x_4 - x_1)\ (y_3 - y_2) - (x_3 - x_2)\ (y_4 - y_1)$$

The streamwise slope is then given by

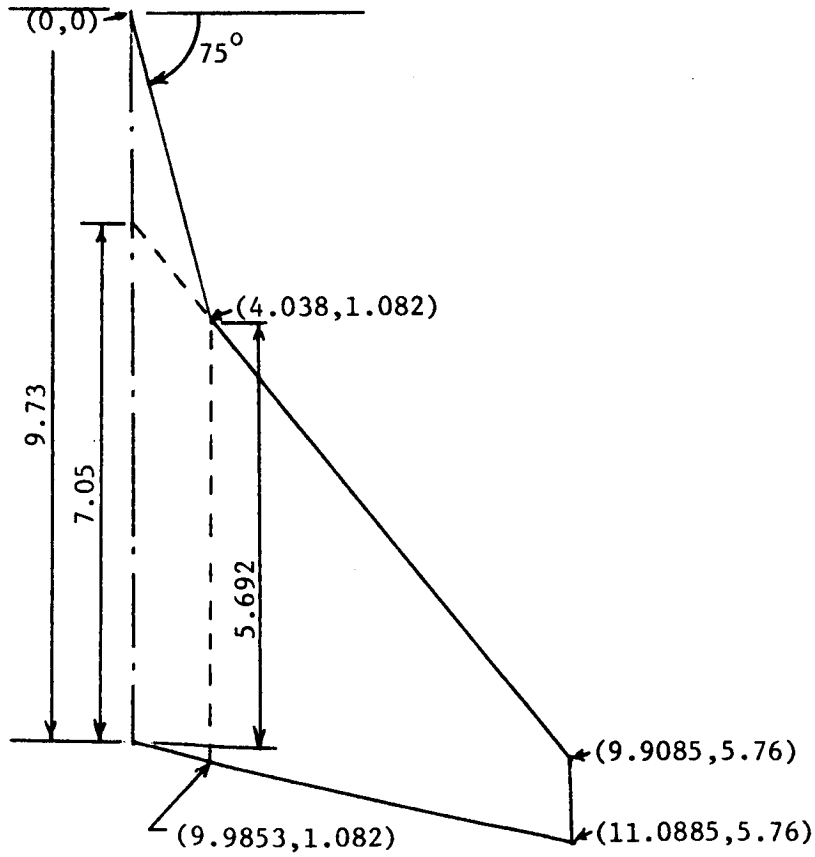
$$\frac{\partial z}{\partial x} = -\frac{a}{c} \tag{11}$$

4. For the input of a curved leading edge, the coordinates (x,y) of the leading edge of inboard chord are regarded as (0,0).

5. The choice of CTILT is based on reference 5. On the other hand, XTILT is to represent the severity of adverse pressure gradient over which the vortex must pass. As a result of using XTILT, the vortex may break down earlier. For a simple wing planform, both CTILT and XTILT are the same. For strake-wing configurations, they are different in general. The choice is somewhat empirical in nature. The following examples will illustrate their choice based on experience.

(1) A strake-wing configuration

This example is taken from reference 10 and is as shown in the following sketch.



For this configuration,

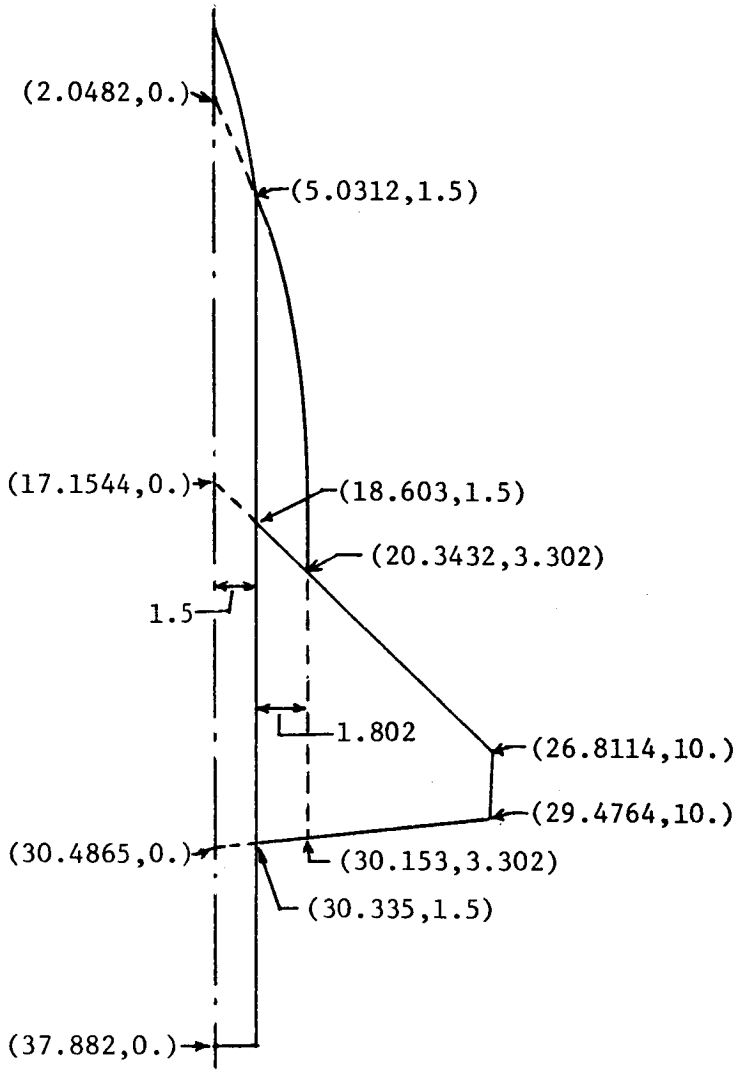
Strake {
CTILT = 5.692
XTILT = $\frac{7.05}{9.73}$ X 4.038 = 2.9258

Note that for a strake, XTILT is to be expressed in terms of the root chord (4.038) of an equivalent delta wing for the strake. Similarly,

Wing {
CTILT = 9.9853 - 9.9085 = 0.0768
XTILT = CTILT = 0.0768

(2) A strake-wing body configuration

This example is taken from reference 11 and is as shown in the following sketch.



In this case, the aft fuselage will contribute to the adverse pressure gradient for the strake vortex. The projected fuselage area on the X-Y plane downstream of the wing leading edge can be calculated to be

$$\frac{37.882 - 17.1544 + 37.882 - 18.603}{2} \times 1.5 = 30.0050.$$

Divided by the total width of the strake region, this is equivalent to a streamwise length of

$$\frac{30.0050}{1.5 + 1.802} = 9.0869$$

Therefore, the total distance of adverse pressure region is

$$9.0869 + (30.335 - 18.603) = 20.8189$$

This must be expressed in terms of the root chord of an equivalent delta wing of the strake as

$$XTILT = \frac{20.8189}{30.4865 - 2.0482} \times (20.3432 - 5.0312) = 11.21 \text{ (for strake vortex)}$$

CTILT is given by

$$CTILT = 30.335 - 20.3432 = 9.9918 \text{ (for strake vortex)}$$

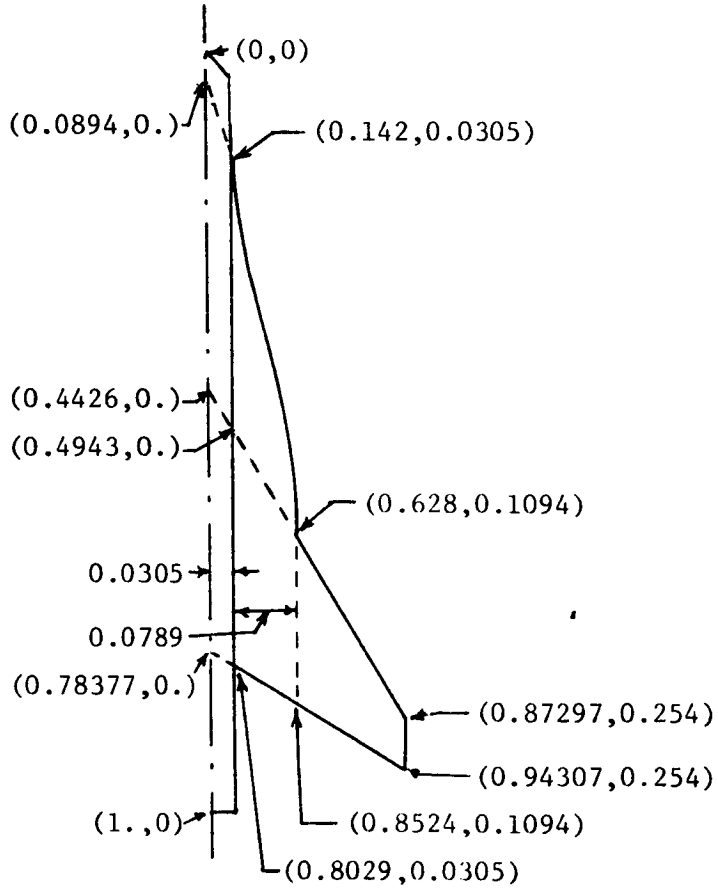
For the wing,

$$CTILT = 30.153 - 26.8114 = 3.3416$$

$$XTILT = CTILT = 3.3416$$

(3) Second strake-wing body configuration

This example is taken from reference 12 and is as shown in the following sketch.



The projected fuselage area on the X-Y plane downstream of the wing leading edge can be calculated to be

$$\frac{1-0.4426 + 1 - 0.4943}{2} \text{ X } 0.0305 = 0.016212$$

Divided by the total width of the strake region, this is equivalent to a streamwise length of

$$\frac{0.016212}{0.0305 + 0.0789} = 0.1482$$

It follows that the total distance of adverse pressure region is

$$0.8029 - 0.4943 + 0.1482 = 0.4568$$

This is expressed in terms of the root chord of an equivalent delta wing of the strake as

$$XTILT = \frac{0.4568}{0.78377 - 0.0894} \times (0.6280 - 0.1420) = 0.32 \quad \text{(for strake vortex)}$$

CTILT is given by

$$CTILT = 0.8029 - 0.6280 = 0.1749 \quad \text{(for strake vortex)}$$

For the wing,

$$CTILT = 0.8524 - 0.87297 = -0.02057$$

$$XTILT = CTILT = -0.02057$$

OUTPUT VARIABLES

(1) At the beginning of the output, all input data will be printed.

HALFSW = half of reference wing area

CREF = reference chord

(2) Vortex element endpoint coordinates

(X1,Y1,Z1) coordinates of the inboard endpoint of a bound vortex element

(X2,Y2,Z2) coordinates of the outboard endpoint of a bound vortex element

(3) Control point coordinates

One set of (XCP, YCP, ZCP) values defines a control point location

(4) Tip suction

X/C nondimensional x coordinate with respect to tip chord

CTIP = $S_t(x)/\ (\frac{1}{2}\rho V_\infty^2 c_t)$, where S_t is the tip suction force per unit length and c_t is the tip chord

Y/S y divided by half span

$$\text{GAMMA} = -\int_{x_\ell}^{x} \gamma_y(x', y)\, dx'$$

GAMAX = γ_x

(5) Pressure distribution in attached flow

XV nondimensional chordwise location (referred to local chord)

YV nondimensional spanwise location (referred to semispan of the lifting surface)

CP = ΔC_p

(6) Sectional characteristics

Y/S nondimensional y-station, referred to semispan of the lifting surface

CL sectional lift coefficient

CM sectional pitching moment coefficient about the Y axis

CT sectional leading-edge thrust coefficient

CDI sectional induced drag coefficient

CS*C sectional suction coefficient multiplied by local chord

CAV sectional axial (along X-axis) force coefficient due to leading edge vortex

(7) The next group of output variables is the overall aerodynamic characteristics in attached potential flow. If ALPCON = 1.0, the lift and pitching moment coefficients will be C_{L_α} and C_{M_α}.

(8) If ALPCON = 1.0, the factors, K_p, $K_{v,\ell e}$, and $K_{v,se}$ etc. to be used in the method of suction analogy for a noncambered

wing will be printed next. They are used in the following formulas:

$$C_L = K_p \sin\alpha\cos^2\alpha + (K_{v,\ell e} + K_{v,se})\sin^2\alpha\cos\alpha$$

$$C_{D_i} = C_L \tan\alpha$$

$$C_m = K_p \sin\alpha\cos\alpha \frac{\bar{x}_p}{C_{ref}} + K_{v,\ell e}\sin^2\alpha \frac{\bar{x}_{\ell e}}{C_{ref}} + K_{v,se}\sin^2\alpha \frac{\bar{x}_{se}}{C_{ref}}$$

(9) If a fuselage is present, the pressure coefficient (C_p) at (X/L, THETA) will be printed, where L is the fuselage length and THETA (i.e. θ) is measured clockwise (facing upstream) from the positive Z axis (i.e. upwards). The fuselage local loading is defined as

$$C_N = \frac{-1}{r} \int_0^{2\pi} C_p \, (r d\theta) \cos\theta \qquad (12)$$

The overall fuselage aerodynamic coefficients are all based on the input reference area and chord.

(10) Next, the attached flow results are summarized. For the lift coefficient,

CL(LS) the total lift coefficient from all lifting surfaces

CLF the total lift coefficient from the fuselage

CL = CL(LS) + CLF

Similar definitions apply to C_D and C_m.

(11) Total aerodynamic coefficients to be used in the method of suction analogy are summarized as follows, using the lift coefficient (C_L) as an example.

CLP the "potential-flow" component of C_L

CLVLE the leading-edge vortex lift

CLVSE the side-edge (i.e. tip) vortex lift

CLVAUG the augmented vortex lift

CLDVP the "potential-flow" component of C_L due to the strake discrete vortex

CLDVV the vortex lift component due to the strake discrete vortex

CLF the fuselage lift

CL total lift coefficient

CAXP the axial force coefficient in potential flow, negative for pointing forward

CAXV the axial force coefficient due to leading-edge vortex

(12) For an asymmetrical configuration or a configuration with lateral or directional control input, the resulting rolling (CL) and yawing (CN) moments will be printed for both attached and vortex flows, with and without tip suction effect. Based on experience, those without tip suction effect seem to agree better with limited windtunnel data.

(13) The lateral-directional stability derivatives are defined in accordance with standard definitions as follows:

$$CYB = \frac{\partial C_y}{\partial \beta}\ ,\ C_y = \text{side force}/q\ S_{ref}$$

$$CLB = \frac{\partial C_\ell}{\partial \beta}\ ,\ C_\ell = \text{rolling moment}/q\ S_{ref}\ b_{ref}$$

$$CNB = \frac{\partial C_n}{\partial \beta}\ ,\ C_n = \text{yawing moment}/q\ S_{ref}\ b_{ref}$$

$$CYP = \frac{\partial C_y}{\partial \bar{p}}\ ,\ \text{where } \bar{p} = pb/2V_\infty \text{ is an input variable and p is the roll rate}$$

$$CLP = \frac{\partial C_\ell}{\partial \bar{p}}$$

$$CNP = \frac{\partial C_n}{\partial \bar{p}}$$

$$CYR = \frac{\partial C_y}{\partial \bar{r}}$$, where $\bar{r} = rb/2V_\infty$ is an input variable and r is the yaw rate

$$CLR = \frac{\partial C_\ell}{\partial \bar{r}}$$

$$CNR = \frac{\partial C_n}{\partial \bar{r}}$$

(14) The bending moment distribution and the bending moment coefficients at the root chord for the <u>attached flow</u> will be printed last.

PROGRAM JOB CONTROL SET-UP

The code can be run in overlays or segmentation. The following segmentation set-up is for the Cyber 175 computer system at the NASA Langley Research Center.

```
*
*   SEGMENTATION DIRECTIVES FOR THE UNIVERSITY
*   OF KANSAS PROGRAM "VORSTAB".
*
*   APRIL, 1984
*
            COMMON
 ROOT       TREE        VORSTAB-(GEMTRY,DWASH,SOLUTN,LOAD)
*
 VORSTAB    INCLUDE     VORSTAB,FUR,SLOP,FUSVOL,UNWF,FUSELA
 VORSTAB    INCLUDE     ZCDX,TWIST,ZCR,ZCAM,VMSEQN,PNLEF
*
 GEMTRY     INCLUDE     GEMTRY,GEOFUS,PANEL,SPLINE,SHAPLE,SHAPTE
*
 DWASH      INCLUDE     DWASH,INVN,WING,UNFW,VELFUS,FALONE
*
 SOLUTN     INCLUDE     SOLUTN,THRUST,GAMAX,AUGVOR,SPNINT,LATERL
 SOLUTN     INCLUDE     WBETA,VLCTY,VERCOR
*
 LOAD       INCLUDE     LOAD,CPFUS,UTFW,FUSLFT,CENTRD,FRATN
 LOAD       INCLUDE     REDBD,BDPT,BENDIN,BACKWH,DRAG
*
            END
```

Notes.

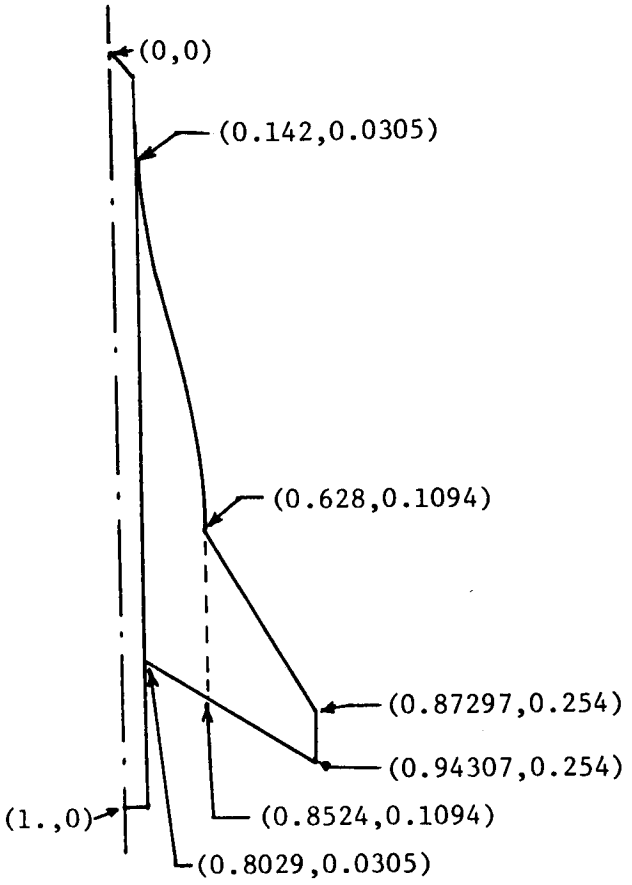
(1) With existing dimensions for some arrays, a total number of unknowns equal to 195 is allowed. The minimum memory for execution with overlays is 80K (decimal).

(2) Four (4) working disk files are needed during execution. They are designated as (01), (02), (03) and (04).

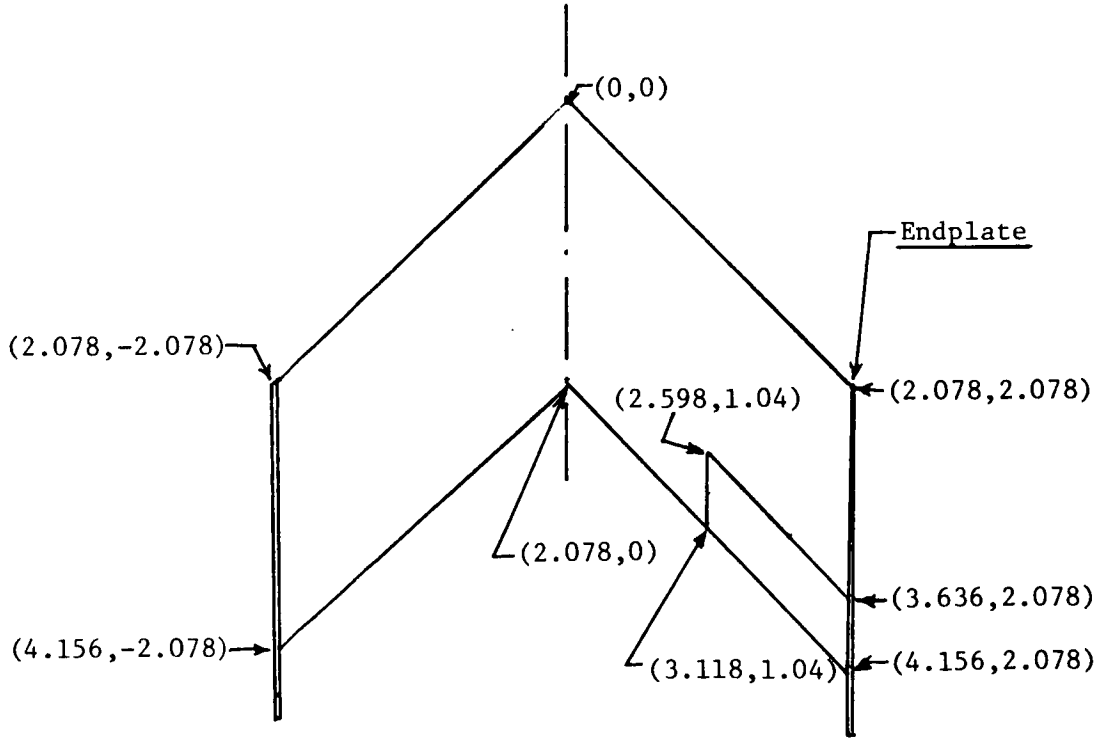
(3) An example of calculating total number of unknowns is given on page 61.

Three sample cases are included in the following. The configurations are shown below.

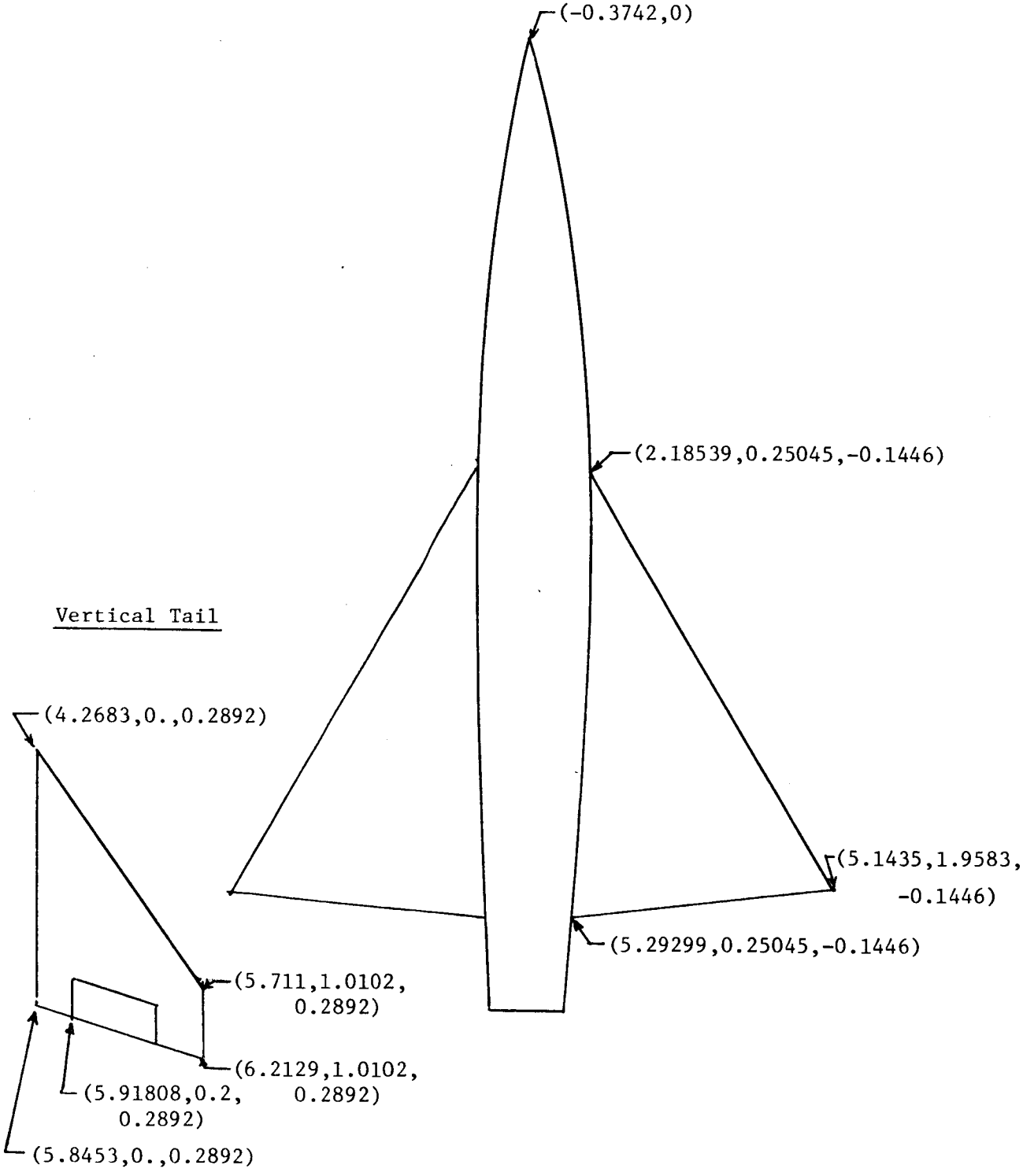
1. Sample Case 1.



2. Sample Case 2



3. Sample Case 3



1. Sample Case 1

Input Data

```
LARGE STRAKE-WING OF FOX, TM 74071
        10          0          0          1
         1          0          0          1
         3          3          4          7          3          0          0
         1          1          0          3          0          0          0
 0.000000
         6          0          0          0          0
         0
 0.000000   1.000000   0.000000    .030500   1.000000    .030500   0.000000   0.000000
         1
  .142000    .802900    .030500    .628000    .852400    .109400   0.000000   0.000000
        12          2          1          0
 0.000000    .197300    .210400    .223500    .236700    .302400    .315600    .341800
  .355000    .368200    .381300    .486000
 0.000000    .033500    .036100    .038450    .043400    .063500    .067100    .072980
  .075350    .077160    .078740    .078900
 0.000000    .049500
 0.000000    .078900
         0
  .628000    .852400    .109400    .872970    .943070    .254000   0.000000   0.000000
  .300000    .051600    .233000    .254000    .571500   0.000000
 1.000000   2.000000   1.000000   0.000000
36.000000
 4.000000   7.000000    .174900    .492400    .740200    .109400    .320000   0.000000
 8.000000  14.000000   -.020570    .284500    .908020    .254000   -.020570   0.000000
 0.000000   0.000000   0.000000
 0.000000   0.000000
  .100000    .087270   0.000000   0.000000   0.000000
         0          0          0          0
```

Output

```
****************************************
LARGE STRAKE-WING OF FOX, TM 74071
****************************************
      10          0          0          1
****************************************
CASE NUMBER = 10
****************************************

INPUT DATA
         1          0          0          1
         3          3          4          7          3          0          0
         1          1          0          3          0          0          0
 0.000000
         6          0          0          0          0
         0
 0.000000   1.000000   0.000000    .030500   1.000000    .030500   0.000000   0.000000
         1
  .142000    .802900    .030500    .628000    .852400    .109400   0.000000   0.000000
        12          2          1          0
 0.000000    .197300    .210400    .223500    .236700    .302400    .315600    .341800
  .355000    .368200    .381300    .486000
 0.000000    .033500    .036100    .038450    .043400    .063500    .067100    .072980
  .075350    .077160    .078740    .078900
 0.000000    .049500
 0.000000    .078900
         0
  .628000    .852400    .109400    .872970    .943070    .254000   0.000000   0.000000
  .300000    .051600    .233000    .254000    .571500  0.000000
1.000000   2.000000   1.000000   0.000000
36.000000
 4.000000   7.000000    .174900    .492400    .740200    .109400    .320000   0.000000
 8.000000  14.000000   -.020570    .284500    .908020    .254000   -.020570   0.000000
 0.000000   0.000000   0.000000
 0.000000   0.000000
  .100000    .087270   0.000000   0.000000   0.000000
         0          0          0          0
          HALF SW=  .51600E-01          CREF=  .23300E+00

VORTEX ELEMENT ENDPOINT COORDINATES=

   X1         X2         Y1         Y2         Z1         Z2
   .01704     .02629    0.00000     .00941    0.00000    0.00000
   .14645     .15448    0.00000     .00941    0.00000    0.00000
   .37059     .37652    0.00000     .00941    0.00000    0.00000
   .62941     .63290    0.00000     .00941    0.00000    0.00000
   .85355     .85493    0.00000     .00941    0.00000    0.00000
   .98296     .98312    0.00000     .00941    0.00000    0.00000
   .02629     .03776     .00941     .02109    0.00000    0.00000
```

.15448	.16444	.00941	.02109	0.00000	0.00000
.37652	.38386	.00941	.02109	0.00000	0.00000
.63290	.63722	.00941	.02109	0.00000	0.00000
.85493	.85664	.00941	.02109	0.00000	0.00000
.98312	.98332	.00941	.02109	0.00000	0.00000
.03776	.04702	.02109	.03050	0.00000	0.00000
.16444	.17248	.02109	.03050	0.00000	0.00000
.38386	.38979	.02109	.03050	0.00000	0.00000
.63722	.64071	.02109	.03050	0.00000	0.00000
.85664	.85802	.02109	.03050	0.00000	0.00000
.98332	.98348	.02109	.03050	0.00000	0.00000
.15326	.29600	.03050	.04676	0.00000	0.00000
.23879	.36408	.03050	.04676	0.00000	0.00000
.38692	.48199	.03050	.04676	0.00000	0.00000
.55798	.61815	.03050	.04676	0.00000	0.00000
.70611	.73606	.03050	.04676	0.00000	0.00000
.79164	.80414	.03050	.04676	0.00000	0.00000
.29600	.37735	.04676	.06995	0.00000	0.00000
.36408	.43663	.04676	.06995	0.00000	0.00000
.48199	.53931	.04676	.06995	0.00000	0.00000
.61815	.65788	.04676	.06995	0.00000	0.00000
.73606	.76056	.04676	.06995	0.00000	0.00000
.80414	.81985	.04676	.06995	0.00000	0.00000
.37735	.44939	.06995	.09314	0.00000	0.00000
.43663	.50110	.06995	.09314	0.00000	0.00000
.53931	.59068	.06995	.09314	0.00000	0.00000
.65788	.69410	.06995	.09314	0.00000	0.00000
.76056	.78368	.06995	.09314	0.00000	0.00000
.81985	.83539	.06995	.09314	0.00000	0.00000
.44939	.63182	.09314	.10940	0.00000	0.00000
.50110	.66086	.09314	.10940	0.00000	0.00000
.59068	.71116	.09314	.10940	0.00000	0.00000
.69410	.76924	.09314	.10940	0.00000	0.00000
.78368	.81954	.09314	.10940	0.00000	0.00000
.83539	.84858	.09314	.10940	0.00000	0.00000
.63182	.65224	.10940	.12158	0.00000	0.00000
.66086	.67960	.10940	.12158	0.00000	0.00000
.71116	.72698	.10940	.12158	0.00000	0.00000
.76924	.78170	.10940	.12158	0.00000	0.00000
.81954	.82908	.10940	.12158	0.00000	0.00000
.84858	.85644	.10940	.12158	0.00000	0.00000
.65224	.68567	.12158	.14153	0.00000	0.00000
.67960	.71028	.12158	.14153	0.00000	0.00000
.72698	.75289	.12158	.14153	0.00000	0.00000
.78170	.80209	.12158	.14153	0.00000	0.00000
.82908	.84471	.12158	.14153	0.00000	0.00000
.85644	.86931	.12158	.14153	0.00000	0.00000
.68567	.72935	.14153	.16759	0.00000	0.00000
.71028	.75036	.14153	.16759	0.00000	0.00000

.75289	.78674	.14153	.16759	0.00000	0.00000
.80209	.82874	.14153	.16759	0.00000	0.00000
.84471	.86512	.14153	.16759	0.00000	0.00000
.88931	.88613	.14153	.16759	0.00000	0.00000
.72935	.77663	.16759	.19581	0.00000	0.00000
.75036	.79374	.16759	.19581	0.00000	0.00000
.78674	.82337	.16759	.19581	0.00000	0.00000
.82874	.85759	.16759	.19581	0.00000	0.00000
.86512	.88722	.16759	.19581	0.00000	0.00000
.88613	.90433	.16759	.19581	0.00000	0.00000
.77663	.82031	.19581	.22187	0.00000	0.00000
.79374	.83382	.19581	.22187	0.00000	0.00000
.82337	.85722	.19581	.22187	0.00000	0.00000
.85759	.88424	.19581	.22187	0.00000	0.00000
.88722	.90763	.19581	.22187	0.00000	0.00000
.90433	.92114	.19581	.22187	0.00000	0.00000
.82031	.85374	.22187	.24182	0.00000	0.00000
.83382	.86450	.22187	.24182	0.00000	0.00000
.85722	.88312	.22187	.24182	0.00000	0.00000
.88424	.90463	.22187	.24182	0.00000	0.00000
.90763	.92326	.22187	.24182	0.00000	0.00000
.92114	.93401	.22187	.24182	0.00000	0.00000
.85374	.87184	.24182	.25261	0.00000	0.00000
.86450	.88110	.24182	.25261	0.00000	0.00000
.88312	.89714	.24182	.25261	0.00000	0.00000
.90463	.91567	.24182	.25261	0.00000	0.00000
.92326	.93172	.24182	.25261	0.00000	0.00000
.93401	.94098	.24182	.25261	0.00000	0.00000

CONTROL POINT COORDINATES=

XCP	YCP	ZCP	XCP	YCP	ZCP
.07115	.00447	0.00000	.25335	.00447	0.00000
.50223	.00447	0.00000	.75112	.00447	0.00000
.93331	.00447	0.00000	1.00000	.00447	0.00000
.08122	.01525	0.00000	.26144	.01525	0.00000
.50762	.01525	0.00000	.75381	.01525	0.00000
.93403	.01525	0.00000	1.00000	.01525	0.00000
.09128	.02603	0.00000	.26953	.02603	0.00000
.51302	.02603	0.00000	.75651	.02603	0.00000
.93476	.02603	0.00000	1.00000	.02603	0.00000
.24928	.03803	0.00000	.35880	.03803	0.00000
.50841	.03803	0.00000	.65802	.03803	0.00000
.76754	.03803	0.00000	.80763	.03803	0.00000
.35925	.05776	0.00000	.44963	.05776	0.00000
.57308	.05776	0.00000	.69654	.05776	0.00000
.78692	.05776	0.00000	.82000	.05776	0.00000
.43657	.08214	0.00000	.51478	.08214	0.00000
.62162	.08214	0.00000	.72846	.08214	0.00000

.80667	.08214	0.00000	.83530	.08214	0.00000
.56256	.10187	0.00000	.61849	.10187	0.00000
.69488	.10187	0.00000	.77128	.10187	0.00000
.82720	.10187	0.00000	.84767	.10187	0.00000
.65196	.11490	0.00000	.69196	.11490	0.00000
.74659	.11490	0.00000	.80122	.11490	0.00000
.84121	.11490	0.00000	.85585	.11490	0.00000
.67739	.13058	0.00000	.71433	.13058	0.00000
.76478	.13058	0.00000	.81523	.13058	0.00000
.85216	.13058	0.00000	.86568	.13058	0.00000
.71545	.15403	0.00000	.74781	.15403	0.00000
.79200	.15403	0.00000	.83619	.15403	0.00000
.86854	.15403	0.00000	.88039	.15403	0.00000
.76035	.18170	0.00000	.78730	.18170	0.00000
.82411	.18170	0.00000	.86092	.18170	0.00000
.88787	.18170	0.00000	.89773	.18170	0.00000
.80524	.20937	0.00000	.82679	.20937	0.00000
.85622	.20937	0.00000	.88565	.20937	0.00000
.90720	.20937	0.00000	.91508	.20937	0.00000
.84330	.23282	0.00000	.86027	.23282	0.00000
.88344	.23282	0.00000	.90662	.23282	0.00000
.92358	.23282	0.00000	.92979	.23282	0.00000
.86874	.24850	0.00000	.88264	.24850	0.00000
.90163	.24850	0.00000	.92063	.24850	0.00000
.93453	.24850	0.00000	.93962	.24850	0.00000

****
ANGLE OF ATTACK = 36.000 DEG.
****

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
.01704	.29393
.14645	1.64777
.37059	2.13456
.62941	2.17448
.85355	2.27514
.98296	2.27800

TIP SUCTION COEFFICIENT= .09476 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -.34030

ELEMENT	Y/S	GAMMA	GAMAX
1	.01759	-.02194	.53171
2	.01759	-.04538	.15081
3	.01759	-.08392	.19733
4	.01759	-.13045	.05675
5	.01759	-.14713	.03163

6	.01759	-.15351	.01691
7	.06004	-.01978	.90803
8	.06004	-.04239	.60178
9	.06004	-.08245	.35227
10	.06004	-.12974	.16483
11	.06004	-.14632	.13474
12	.06004	-.15212	.24226
13	.10249	-.01306	1.18747
14	.10249	-.03459	1.07977
15	.10249	-.07934	.51189
16	.10249	-.12787	.27548
17	.10249	-.14439	.23804
18	.10249	-.14828	.47044
19	.14974	-.01406	5.62237
20	.14974	-.03854	.47834
21	.14974	-.08047	.59609
22	.14974	-.11900	.85633
23	.14974	-.13346	.28663
24	.14974	-.14082	.18488
25	.22740	-.01764	3.62719
26	.22740	-.05861	.90913
27	.22740	-.09037	.61790
28	.22740	-.11004	.84778
29	.22740	-.12900	.48844
30	.22740	-.13730	.26259
31	.32339	-.02161	4.55613
32	.32339	-.05565	1.57453
33	.32339	-.07448	1.27157
34	.32339	-.09575	.89644
35	.32339	-.12060	.57474
36	.32339	-.13105	.36632
37	.40105	-.01104	13.13289
38	.40105	-.03352	5.46155
39	.40105	-.05774	3.25179
40	.40105	-.08906	2.06326
41	.40105	-.11569	.81382
42	.40105	-.12429	.47167
43	.45238	-.03923	9.22231
44	.45238	-.09822	2.68852
45	.45238	-.13437	1.01236
46	.45238	-.16239	.60684
47	.45238	-.17980	.51799
48	.45238	-.18564	.47998
49	.51408	-.03116	7.77621
50	.51408	-.08702	2.52112
51	.51408	-.12917	1.26764
52	.51408	-.15806	.81153
53	.51408	-.17397	.63208
54	.51408	-.17860	.52900

55	.60643	-.02729	7.67845
56	.60643	-.07852	2.53032
57	.60643	-.11991	1.42922
58	.60643	-.14786	.97368
59	.60643	-.16217	.76281
60	.60643	-.16614	.63959
61	.71535	-.02411	8.14845
62	.71535	-.06989	2.72788
63	.71535	-.10745	1.59914
64	.71535	-.13230	1.13633
65	.71535	-.14430	.92860
66	.71535	-.14747	.82037
67	.82428	-.02073	8.79373
68	.82428	-.06008	2.99220
69	.82428	-.09186	1.78658
70	.82428	-.11151	1.35854
71	.82428	-.11995	1.22579
72	.82428	-.12199	1.15174
73	.91663	-.01710	9.19286
74	.91663	-.04915	3.13474
75	.91663	-.07250	2.09222
76	.91663	-.08383	1.91550
77	.91663	-.08764	1.91832
78	.91663	-.08852	1.90353
79	.97833	-.01333	8.99949
80	.97833	-.03400	3.75564
81	.97833	-.04289	3.70816
82	.97833	-.04548	4.06675
83	.97833	-.04661	4.14070
84	.97833	-.04677	4.15477

VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER 1 ***

(FOR NONCAMBERED WING)

CENTROID TO MAX. SUCTION FORCE, YBAR = .60666

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)= 5.88343

L.E. LENGTH OF MAX. SUCTION CENTROID = 3.28848

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 38.00000 DEG.
(WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

CENTROID TO MAX. SUCTION FORCE, YBAR = .23657

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)= 2.70303

```
 L.E. LENGTH OF MAX. SUCTION CENTROID =     .87602

 ALPHA FOR VORTEX BREAKDOWN AT T.E. =  16.57974  DEG.
    (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

       VORTEX-BREAKDOWN CHARACTERISTICS

 ***FOR SURFACE NUMBER  1  ***

       (FOR NONCAMBERED WING)

 L.E. LENGTH OF MAX. SUCTION CENTROID =   2.15189

 ALPHA FOR VORTEX BREAKDOWN AT T.E. =  33.31794  DEG.
    (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

 L.E. LENGTH OF MAX. SUCTION CENTROID =     .76585

 ALPHA FOR VORTEX BREAKDOWN AT T.E. =  12.83925  DEG.
    (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

       VORTEX-BREAKDOWN CHARACTERISTICS

 ***FOR SURFACE NUMBER  1  ***

       (FOR NONCAMBERED WING)

 L.E. LENGTH OF MAX. SUCTION CENTROID =  10.52420

 ALPHA FOR VORTEX BREAKDOWN AT T.E. =  41.44240  DEG.
    (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

 L.E. LENGTH OF MAX. SUCTION CENTROID =   1.03240

 ALPHA FOR VORTEX BREAKDOWN AT T.E. =  22.28783  DEG.
    (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)
*****************************************
 ***THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E. HAVE BEEN CORRECTED FOR
        CAMBER AND ADVERSE PRESSURE GRADIENT IN VORTEX LIFT AUGMENTATION, IF ANY***

 ***FOR SURFACE NUMBER  1  ***

 REVISED ALPHA BDTE =    32.257DEGREES
    (FOR SYMMETRICAL LOADING)

 REVISED ALPHA BDTE =    27.575DEGREES
    (FOR RIGHT WING IN SIDESLIP)
```

REVISED ALPHA BDTE = 35.700DEGREES
(FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE = 16.974DEGREES
(FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE = 13.233DEGREES
(FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE = 22.682DEGREES
(FOR LEFT WING IN SIDESLIP)

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 36.000 DEG.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VORTEX	XV	YV	CP
1	.01704	.01759	.89806
2	.14645	.01759	.18870
3	.37059	.01759	.41396
4	.62941	.01759	.43631
5	.85355	.01759	.11845
6	.98296	.01759	.02312
7	.01704	.06004	.82377
8	.14645	.06004	.20266
9	.37059	.06004	.42664
10	.62941	.06004	.44406
11	.85355	.06004	.11107
12	.98296	.06004	.02112
13	.01704	.10249	.57998
14	.14645	.10249	.25716
15	.37059	.10249	.44599
16	.62941	.10249	.45753
17	.85355	.10249	.08706
18	.98296	.10249	.01495
19	.01704	.14974	1.05748
20	.14645	.14974	.45240
21	.37059	.14974	.63233
22	.62941	.14974	.57972
23	.85355	.14974	.26336
24	.98296	.14974	.10871
25	.01704	.22740	1.86931
26	.14645	.22740	.79943
27	.37059	.22740	.43600
28	.62941	.22740	.61915
29	.85355	.22740	.37991
30	.98296	.22740	.14995

31	.01704	.32339	2.47150
32	.14645	.32339	.60794
33	.37059	.32339	.50791
34	.62941	.32339	.74338
35	.85355	.32339	.49377
36	.98296	.32339	.17952
37	.01704	.40105	2.16033
38	.14645	.40105	.94367
39	.37059	.40105	1.10727
40	.62941	.40105	.90305
41	.85355	.40105	.57896
42	.98296	.40105	.19142
43	.01704	.45238	5.79854
44	.14645	.45238	1.73985
45	.37059	.45238	1.10303
46	.62941	.45238	.79654
47	.85355	.45238	.49952
48	.98296	.45238	.15241
49	.01704	.51408	6.14122
50	.14645	.51408	1.98612
51	.37059	.51408	1.16014
52	.62941	.51408	.76074
53	.85355	.51408	.43284
54	.98296	.51408	.13249
55	.01704	.60643	6.68043
56	.14645	.60643	2.19745
57	.37059	.60643	1.24168
58	.62941	.60643	.76259
59	.85355	.60643	.40945
60	.98296	.60643	.12643
61	.01704	.71535	7.32972
62	.14645	.71535	2.41418
63	.37059	.71535	1.32962
64	.62941	.71535	.76969
65	.85355	.71535	.38887
66	.98296	.71535	.11741
67	.01704	.82428	7.99630
68	.14645	.82428	2.60943
69	.37059	.82428	1.37077
70	.62941	.82428	.70789
71	.85355	.82428	.31703
72	.98296	.82428	.09129
73	.01704	.91663	8.43095
74	.14645	.91663	2.63178
75	.37059	.91663	1.14183
76	.62941	.91663	.43830
77	.85355	.91663	.17185
78	.98296	.91663	.04790
79	.01704	.97833	7.76894

80	.14645	.97833	1.63153
81	.37059	.97833	.35577
82	.62941	.97833	.13766
83	.85355	.97833	.05838
84	.98296	.97833	.01604

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
.01759	.28023	.28023	.23824	.01663	.18304	0.00000	0.00000
.06004	.28487	.28487	.22592	.02286	.17871	0.00000	0.00000
.10249	.28362	.28362	.20571	.02485	.17534	0.00000	0.00000
.14974	.48265	.48265	.25621	.10814	.21700	.55841	0.00000
.22740	.58165	.58165	.16052	.13350	.25758	.22852	0.00000
.32339	.68795	.68795	-.01344	.20695	.24403	.14853	0.00000
.40105	1.07431	1.07431	-.37828	.52073	.13688	.69221	0.00000
.45238	1.46848	1.46848	-.71665	.71158	.18735	.29178	0.00000
.51408	1.54695	1.54695	-.85734	.76180	.18228	.19960	0.00000
.60643	1.69804	1.69804	-1.10942	.89223	.13084	.17409	0.00000
.71535	1.88815	1.88815	-1.44069	1.07290	.04565	.16309	0.00000
.82428	2.05863	2.05863	-1.75651	1.27895	-.08518	.15094	0.00000
.91663	2.04958	2.04958	-1.81663	1.43188	-.28079	.13126	0.00000
.97833	1.52968	1.52968	-1.24882	1.27409	-.46348	.09514	

*** THE FOLLOWING ARE ATTACHED POTENTIAL FLOW RESULTS ***

TOTAL LIFT COEFFICIENT = 1.31223

TOTAL INDUCED DRAG COEFFICIENT = .26877

THE INDUCED DRAG PARAMETER = .15609

TOTAL PITCHING MOMENT COEFFICIENT = -.33963

FAR-FIELD INDUCED DRAG= .25789

FAR-FIELD INDUCED DRAG PARAMETER= .14977

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

****

SUMMARY OF ATTACHED FLOW RESULTS AT ALPHA = 36.000 DEG., M = .300

****

CL(LS) = 1.31223 CLF = 0.00000 CL = 1.31223

CD(LS) = .26877 CDF = 0.00000 CD = .26877

CM(LS) = -.33963 CMF = 0.00000 CM = -.33963

****

**INCLUDING THE EFFECT OF LE AND SE VORTEX LIFT*

CYB = -.1864326 CLB = -.4490737 CNB = -.0337335

CYP = .0018970 CLP = -.3734321 CNP = .0019839

CYR = -.0470317 CLR = .4073280 CNR = -.0497574

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -.1864326 CLB = -.3831363 CNB = .2366679

CYP = -.0261098 CLP = -.0669658 CNP = .0144866

CYR = -.0391645 CLR = .4198307 CNR = -.3562236

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 36.000 DEGREES
AND AT MACH NO.= .30,BASED ON BODY AXES(IN PER RADIAN)***

INCLUDING THE EFFECT OF LE VORTEX LIFT

CYB = -.3233720 CLB = -.4395476 CNB = .0599071

CYP = .3876010 CLP = -.2964481 CNP = -.2563306

CYR = -.2214207 CLR = .3173394 CNR = .0642369

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -.3233720 CLB = -.3203890 CNB = .3068255

CYP = .1834280 CLP = -.1428231 CNP = -.1058927

CYR = -.4069593 CLR = .4677772 CNR = -.0893881

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON Q*S*(B/2),
WHERE S = .10320 AND B/2 = .25400
(FOR ATTACHED POTENTIAL FLOW ONLY)

Y/S	BM(RIGHT)	BM(LEFT)
.01759	.29867	.29867
.06004	.27182	.27182
.10249	.24629	.24629
.14974	.21909	.21909

THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

CLP = .98668 CLVLE = .82501 CLVSE = .07167 CLVAUG = .12919

CDP = .71686 CDVLE = .59940 CDVSE = .05207 CDVAUG = .09386

CMP = -.33963 CMVLE = .18324 CMVSE = -.12938 CMVAUG = -.07772

CLDVP = -.08335 CLDVV = -.00767 CLF = 0.00000 CL = 1.92151

CDDVP = -.06056 CDDVV = -.00557 CDF = 0.00000 CD = 1.39606

CMDVP = .00521 CMDVV = -.02624 CMF = 0.00000 CM = -.38452

CAXP = 0.00000 CAXV = 0.00000

****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF .50800 AND A REFERENCE AREA OF .10320

****

STABILITY DERIVATIVES BY POTENTIAL FLOW THEORY

****

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 36.000 DEGREES
AND AT MACH NO.= .30,BASED ON BODY AXES(IN PER RADIAN)***

CYB = -.3738846 CLB = -.8921335 CNB = .1653740

CYP = 1.9001017 CLP = -.1940313 CNP = -.7986785

CYR = -1.1845662 CLR = .5450750 CNR = .4269667

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -.3738846 CLB = -.6245467 CNB = .6581733

CYP = .8409441 CLP = -.1000774 CNP = -.4157586

CYR = -2.0751860 CLR = .9279949 CNR = .3330128

****

STABILITY DERIVATIVES WITH EDGE VORTEX SEPARATION

****

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 36.000 DEGREES
AND AT MACH NO.= .30,BASED ON BODY AXES(IN PER RADIAN)***

.22740	.17771	.17771
.32339	.13243	.13243
.40105	.10073	.10073
.45238	.08224	.08224
.51408	.06250	.06250
.60643	.03845	.03845
.71535	.01807	.01807
.82428	.00585	.00585
.91663	.00098	.00098
.97833	.00004	.00004

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = .310128 (RIGHT), = .310128 (LEFT)

2. Sample Case 2

Input Data

```
TN 2229, AILERON EFFECTIVENESS WITH ENDPLATES FOR 45-DEG WING
  20          0          1          1
   0          0          0          0
   5          3          7          4          4          3          5          0
   0
   1          4          0          0          0          0          0
7.053000
   3          2          0          0          0
   0
3.117000  4.675000 -3.117000  2.078000  3.636000 -2.078000  0.000000-90.000000
   0
2.078000  3.636000 -2.078000  0.000000  1.558000  0.000000  0.000000  0.000000
   0
0.000000  1.558000  0.000000  1.040000  2.598000  1.040000  0.000000  0.000000
   0
1.040000  2.598000  1.040000  2.078000  3.636000  2.078000  0.000000  0.000000
   0
2.078000  3.636000  2.078000  3.117000  4.675000  3.117000  0.000000 90.000000
   0
4.675000  5.195000 -3.117000  3.636000  4.156000 -2.078000  0.000000-90.000000
   0
3.636000  4.156000 -2.078000  1.558000  2.078000  0.000000  0.000000  0.000000
   0
1.558000  2.078000  0.000000  2.598000  3.118000  1.040000  0.000000  0.000000
   0
2.598000  3.118000  1.040000  3.636000  4.156000  2.078000  0.000000  0.000000
   0
3.636000  4.156000  2.078000  4.675000  5.195000  3.117000  0.000000 90.000000
  .270000  8.636170  2.078000  2.078000  1.558500  0.000000
1.000000  0.000000  0.000000  0.000000
12.000000
0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000
0.000000  0.000000  0.000000
0.000000  0.000000
   0          0          0          0
```

Output

```
****************************************
      TN 2229, AILERON EFFECTIVENESS WITH ENDPLATES FOR 45-DEG WING
****************************************
      20         0         1         1
****************************************
CASE NUMBER = 20
****************************************

INPUT DATA
         0         0         0         0
         5         3         7         4         4         3         5         0
         0
         1         4         0         0         0         0         0
 7.053000
         3         2         0         0         0
         0
 3.117000  4.675000 -3.117000  2.078000  3.636000 -2.078000  0.000000-90.000000
         0
 2.078000  3.636000 -2.078000  0.000000  1.558000  0.000000  0.000000  0.000000
         0
 0.000000  1.558000  0.000000  1.040000  2.598000  1.040000  0.000000  0.000000
         0
 1.040000  2.598000  1.040000  2.078000  3.636000  2.078000  0.000000  0.000000
         0
 2.078000  3.636000  2.078000  3.117000  4.675000  3.117000  0.000000 90.000000
         0
 4.675000  5.195000 -3.117000  3.636000  4.156000 -2.078000  0.000000-90.000000
         0
 3.636000  4.156000 -2.078000  1.558000  2.078000  0.000000  0.000000  0.000000
         0
 1.558000  2.078000  0.000000  2.598000  3.118000  1.040000  0.000000  0.000000
         0
 2.598000  3.118000  1.040000  3.636000  4.156000  2.078000  0.000000  0.000000
         0
 3.636000  4.156000  2.078000  4.675000  5.195000  3.117000  0.000000 90.000000
  .270000  8.636170  2.078000  2.078000  1.558500  0.000000
 1.000000  0.000000  0.000000  0.000000
12.000000
 0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000
 0.000000  0.000000  0.000000
 0.000000  0.000000
         0         0         0         0
          HALF SW=  .86362E+01          CREF=  .20780E+01

VORTEX ELEMENT ENDPOINT COORDINATES=

    X1        X2        Y1        Y2        Z1        Z2
  3.18182   2.90067  -3.07746  -2.79630   0.00000   0.00000
```

3.85646	3.57530	-3.07746	-2.79630	0.00000	0.00000
4.53109	4.24994	-3.07746	-2.79630	0.00000	0.00000
2.90067	2.50306	-2.79630	-2.39870	0.00000	0.00000
3.57530	3.17770	-2.79630	-2.39870	0.00000	0.00000
4.24994	3.85233	-2.79630	-2.39870	0.00000	0.00000
2.50306	2.18237	-2.39870	-2.07800	0.00000	0.00000
3.17770	2.85700	-2.39870	-2.07800	0.00000	0.00000
3.85233	3.53163	-2.39870	-2.07800	0.00000	0.00000
2.18237	2.00726	-2.07800	-1.90290	0.00000	0.00000
2.85700	2.68190	-2.07800	-1.90290	0.00000	0.00000
3.53163	3.35653	-2.07800	-1.90290	0.00000	0.00000
2.00726	1.72060	-1.90290	-1.61624	0.00000	0.00000
2.68190	2.39524	-1.90290	-1.61624	0.00000	0.00000
3.35653	3.06987	-1.90290	-1.61624	0.00000	0.00000
1.72060	1.34607	-1.61624	-1.24170	0.00000	0.00000
2.39524	2.02070	-1.61624	-1.24170	0.00000	0.00000
3.06987	2.69533	-1.61624	-1.24170	0.00000	0.00000
1.34607	.94067	-1.24170	-.83630	0.00000	0.00000
2.02070	1.61530	-1.24170	-.83630	0.00000	0.00000
2.69533	2.28993	-1.24170	-.83630	0.00000	0.00000
.94067	.56613	-.83630	-.46176	0.00000	0.00000
1.61530	1.24076	-.83630	-.46176	0.00000	0.00000
2.28993	1.91540	-.83630	-.46176	0.00000	0.00000
.56613	.27947	-.46176	-.17510	0.00000	0.00000
1.24076	.95410	-.46176	-.17510	0.00000	0.00000
1.91540	1.62874	-.46176	-.17510	0.00000	0.00000
.27947	.10437	-.17510	-.00000	0.00000	0.00000
.95410	.77900	-.17510	-.00000	0.00000	0.00000
1.62874	1.45363	-.17510	-.00000	0.00000	0.00000
.10437	.31872	0.00000	.21435	0.00000	0.00000
.77900	.99335	0.00000	.21435	0.00000	0.00000
1.45363	1.66799	0.00000	.21435	0.00000	0.00000
.31872	.62437	.21435	.52000	0.00000	0.00000
.99335	1.29900	.21435	.52000	0.00000	0.00000
1.66799	1.97363	.21435	.52000	0.00000	0.00000
.62437	.93001	.52000	.82565	0.00000	0.00000
1.29900	1.60465	.52000	.82565	0.00000	0.00000
1.97363	2.27928	.52000	.82565	0.00000	0.00000
.93001	1.14437	.82565	1.04000	0.00000	0.00000
1.60465	1.81900	.82565	1.04000	0.00000	0.00000
2.27928	2.49363	.82565	1.04000	0.00000	0.00000
1.14437	1.35831	1.04000	1.25394	0.00000	0.00000
1.81900	2.03294	1.04000	1.25394	0.00000	0.00000
2.49363	2.70757	1.04000	1.25394	0.00000	0.00000
1.35831	1.66337	1.25394	1.55900	0.00000	0.00000
2.03294	2.33800	1.25394	1.55900	0.00000	0.00000
2.70757	3.01263	1.25394	1.55900	0.00000	0.00000
1.66337	1.96843	1.55900	1.86406	0.00000	0.00000
2.33800	2.64306	1.55900	1.86406	0.00000	0.00000

3.01263	3.31769	1.55900	1.86406	0.00000	0.00000
1.96843	2.18237	1.86406	2.07800	0.00000	0.00000
2.64306	2.85700	1.86406	2.07800	0.00000	0.00000
3.31769	3.53163	1.86406	2.07800	0.00000	0.00000
2.18237	2.50306	2.07800	2.39870	0.00000	0.00000
2.85700	3.17770	2.07800	2.39870	0.00000	0.00000
3.53163	3.85233	2.07800	2.39870	0.00000	0.00000
2.50306	2.90067	2.39870	2.79630	0.00000	0.00000
3.17770	3.57530	2.39870	2.79630	0.00000	0.00000
3.85233	4.24994	2.39870	2.79630	0.00000	0.00000
2.90067	3.18182	2.79630	3.07746	0.00000	0.00000
3.57530	3.85646	2.79630	3.07746	0.00000	0.00000
4.24994	4.53109	2.79630	3.07746	0.00000	0.00000
4.71161	4.43046	-3.07746	-2.79630	0.00000	0.00000
5.07930	4.79815	-3.07746	-2.79630	0.00000	0.00000
4.43046	4.03285	-2.79630	-2.39870	0.00000	0.00000
4.79815	4.40054	-2.79630	-2.39870	0.00000	0.00000
4.03285	3.71215	-2.39870	-2.07800	0.00000	0.00000
4.40054	4.07985	-2.39870	-2.07800	0.00000	0.00000
3.71215	3.53705	-2.07800	-1.90290	0.00000	0.00000
4.07985	3.90474	-2.07800	-1.90290	0.00000	0.00000
3.53705	3.25039	-1.90290	-1.61624	0.00000	0.00000
3.90474	3.61809	-1.90290	-1.61624	0.00000	0.00000
3.25039	2.87585	-1.61624	-1.24170	0.00000	0.00000
3.61809	3.24355	-1.61624	-1.24170	0.00000	0.00000
2.87585	2.47045	-1.24170	-.83630	0.00000	0.00000
3.24355	2.83815	-1.24170	-.83630	0.00000	0.00000
2.47045	2.09591	-.83630	-.46176	0.00000	0.00000
2.83815	2.46361	-.83630	-.46176	0.00000	0.00000
2.09591	1.80926	-.46176	-.17510	0.00000	0.00000
2.46361	2.17695	-.46176	-.17510	0.00000	0.00000
1.80926	1.63415	-.17510	-.00000	0.00000	0.00000
2.17695	2.00185	-.17510	-.00000	0.00000	0.00000
1.63415	1.84850	0.00000	.21435	0.00000	0.00000
2.00185	2.21620	0.00000	.21435	0.00000	0.00000
1.84850	2.15415	.21435	.52000	0.00000	0.00000
2.21620	2.52185	.21435	.52000	0.00000	0.00000
2.15415	2.45980	.52000	.82565	0.00000	0.00000
2.52185	2.82750	.52000	.82565	0.00000	0.00000
2.45980	2.67415	.82565	1.04000	0.00000	0.00000
2.82750	3.04185	.82565	1.04000	0.00000	0.00000
2.67415	2.88809	1.04000	1.25394	0.00000	0.00000
3.04185	3.25579	1.04000	1.25394	0.00000	0.00000
2.88809	3.19315	1.25394	1.55900	0.00000	0.00000
3.25579	3.56085	1.25394	1.55900	0.00000	0.00000
3.19315	3.49821	1.55900	1.86406	0.00000	0.00000
3.56085	3.86591	1.55900	1.86406	0.00000	0.00000
3.49821	3.71215	1.86406	2.07800	0.00000	0.00000
3.86591	4.07985	1.86406	2.07800	0.00000	0.00000

3.71215	4.03285	2.07800	2.39870	0.00000	0.00000
4.07985	4.40054	2.07800	2.39870	0.00000	0.00000
4.03285	4.43046	2.39870	2.79630	0.00000	0.00000
4.40054	4.79815	2.39870	2.79630	0.00000	0.00000
4.43046	4.71161	2.79630	3.07746	0.00000	0.00000
4.79815	5.07930	2.79630	3.07746	0.00000	0.00000

CONTROL POINT COORDINATES*

XCP	YCP	ZCP	XCP	YCP	ZCP
3.35434	-2.96484	0.00000	4.13334	-2.96484	0.00000
4.52284	-2.96484	0.00000	2.98700	-2.59750	0.00000
3.76600	-2.59750	0.00000	4.15550	-2.59750	0.00000
2.61966	-2.23016	0.00000	3.39866	-2.23016	0.00000
3.78816	-2.23016	0.00000	2.38841	-1.99891	0.00000
3.16741	-1.99891	0.00000	3.55691	-1.99891	0.00000
2.16318	-1.77368	0.00000	2.94218	-1.77368	0.00000
3.33168	-1.77368	0.00000	1.82611	-1.43661	0.00000
2.60511	-1.43661	0.00000	2.99461	-1.43661	0.00000
1.42850	-1.03900	0.00000	2.20750	-1.03900	0.00000
2.59700	-1.03900	0.00000	1.03089	-.64139	0.00000
1.80989	-.64139	0.00000	2.19939	-.64139	0.00000
.69382	-.30432	0.00000	1.47282	-.30432	0.00000
1.86232	-.30432	0.00000	.46859	-.07909	0.00000
1.24759	-.07909	0.00000	1.63709	-.07909	0.00000
.48881	.09931	0.00000	1.26781	.09931	0.00000
1.65731	.09931	0.00000	.74881	.35931	0.00000
1.52781	.35931	0.00000	1.91731	.35931	0.00000
1.07019	.68069	0.00000	1.84919	.68069	0.00000
2.23869	.68069	0.00000	1.33019	.94069	0.00000
2.10919	.94069	0.00000	2.49869	.94069	0.00000
1.52862	1.13912	0.00000	2.30762	1.13912	0.00000
2.69712	1.13912	0.00000	1.78812	1.39862	0.00000
2.56712	1.39862	0.00000	2.95662	1.39862	0.00000
2.10888	1.71938	0.00000	2.88788	1.71938	0.00000
3.27738	1.71938	0.00000	2.36838	1.97888	0.00000
3.14738	1.97888	0.00000	3.53688	1.97888	0.00000
2.61966	2.23016	0.00000	3.39866	2.23016	0.00000
3.78816	2.23016	0.00000	2.98700	2.59750	0.00000
3.76600	2.59750	0.00000	4.15550	2.59750	0.00000
3.35434	2.96484	0.00000	4.13334	2.96484	0.00000
4.52284	2.96484	0.00000	4.78284	-2.96484	0.00000
5.04284	-2.96484	0.00000	4.41550	-2.59750	0.00000
4.67550	-2.59750	0.00000	4.04816	-2.23016	0.00000
4.30816	-2.23016	0.00000	3.81691	-1.99891	0.00000
4.07691	-1.99891	0.00000	3.59168	-1.77368	0.00000
3.85168	-1.77368	0.00000	3.25461	-1.43661	0.00000
3.51461	-1.43661	0.00000	2.85700	-1.03900	0.00000
3.11700	-1.03900	0.00000	2.45939	-.64139	0.00000

2.71939	-.64139	0.00000	2.12232	-.30432	0.00000
2.38232	-.30432	0.00000	1.89709	-.07909	0.00000
2.15709	-.07909	0.00000	1.91731	.09931	0.00000
2.17731	.09931	0.00000	2.17731	.35931	0.00000
2.43731	.35931	0.00000	2.49869	.68069	0.00000
2.75869	.68069	0.00000	2.75869	.94069	0.00000
3.01869	.94069	0.00000	2.95712	1.13912	0.00000
3.21712	1.13912	0.00000	3.21662	1.39862	0.00000
3.47662	1.39862	0.00000	3.53738	1.71938	0.00000
3.79738	1.71938	0.00000	3.79688	1.97888	0.00000
4.05688	1.97888	0.00000	4.04816	2.23016	0.00000
4.30816	2.23016	0.00000	4.41550	2.59750	0.00000
4.67550	2.59750	0.00000	4.78284	2.96484	0.00000
5.04284	2.96484	0.00000			

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ANGLE OF ATTACK = 12.000 DEG.

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CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
.05022	.00616
.37488	.02520
.69954	.02748
.78641	.02962
.96335	.03003

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
.05022	.00486
.37488	.01932
.69954	.02023
.78641	.02143
.96335	.02163

TIP SUCTION COEFFICIENT= .01082 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -2.79276

ELEMENT	Y/S	GAMMA	GAMAX
1	-.95118	-.05787	-.41926
2	-.95118	-.12154	-.41331
3	-.95118	-.12966	-.45029
4	-.83333	-.09486	-.50340
5	-.83333	-.22031	-.30186
6	-.83333	-.25368	-.31325
7	-.71548	-.11718	-.59864
8	-.71548	-.29300	-.32962

9	-.71548	-.35604	-.31820
10	-.64129	-.17107	-.81399
11	-.64129	-.40965	-.36760
12	-.64129	-.48368	-.41275
13	-.56904	-.17868	-.86448
14	-.56904	-.44238	-.32197
15	-.56904	-.53845	-.24572
16	-.46089	-.18525	-.87099
17	-.46089	-.46480	-.26840
18	-.46089	-.57241	-.16342
19	-.33333	-.18212	-.83951
20	-.33333	-.46812	-.23621
21	-.33333	-.58676	-.12536
22	-.20577	-.16992	-.76492
23	-.20577	-.45186	-.19257
24	-.20577	-.58069	-.08747
25	-.09763	-.14916	-.64834
26	-.09763	-.41926	-.15233
27	-.09763	-.55980	-.06899
28	-.02537	-.13087	-.57151
29	-.02537	-.39074	-.15637
30	-.02537	-.53913	-.05140
31	.03186	-.13213	.56037
32	.03186	-.39284	.12923
33	.03186	-.54158	.04218
34	.11527	-.15377	.67407
35	.11527	-.42792	.15563
36	.11527	-.56814	.06028
37	.21838	-.17213	.77769
38	.21838	-.45894	.19381
39	.21838	-.59258	.07591
40	.30179	-.18085	.83389
41	.30179	-.47375	.22919
42	.30179	-.60746	.09839
43	.36545	-.18559	.85319
44	.36545	-.48019	.23713
45	.36545	-.62378	.15547
46	.44871	-.18850	.88477
47	.44871	-.48491	.26532
48	.44871	-.63271	.21124
49	.55161	-.18579	.89085
50	.55161	-.47774	.31685
51	.55161	-.62251	.31035
52	.63487	-.17989	.86921
53	.63487	-.45552	.36362
54	.63487	-.58002	.41968
55	.71548	-.12523	.63671
56	.71548	-.33417	.38802
57	.71548	-.42956	.42093

ORIGINAL PAGE IS
OF POOR QUALITY

58	.83333	-.10550	.55785
59	.83333	-.25537	.35814
60	.83333	-.30351	.39146
61	.95118	-.06537	.47563
62	.95118	-.14036	.48958
63	.95118	-.15270	.54140
64	-.95118	-.13268	-.45284
65	-.95118	-.13353	-.4[illegible]439
66	-.83333	-.25872	-.31183
67	-.83333	-.26143	-.30792
68	-.71548	-.36474	-.31155
69	-.71548	-.36985	-.29988
70	-.64129	-.49682	-.43690
71	-.64129	-.50470	-.41681
72	-.56904	-.55799	-.23478
73	-.56904	-.56868	-.21363
74	-.46089	-.59681	-.14280
75	-.46089	-.61104	-.10719
76	-.33333	-.61426	-.10025
77	-.33333	-.63086	-.05750
78	-.20577	-.61205	-.06456
79	-.20577	-.63117	-.01774
80	-.09763	-.59649	-.04701
81	-.09763	-.61919	-.00026
82	-.02537	-.57934	-.04187
83	-.02537	-.60741	-.00324
84	.03186	-.58202	.02526
85	.03186	-.60954	-.02288
86	.11527	-.60524	.03448
87	.11527	-.62833	-.01687
88	.21838	-.62801	.03545
89	.21838	-.65030	-.02903
90	.30179	-.64860	.03361
91	.30179	-.67478	-.06000
92	.36545	-.68730	.09628
93	.36545	-.72246	-.03751
94	.44871	-.70292	.16647
95	.44871	-.73913	.03598
96	.55161	-.68927	.30397
97	.55161	-.72180	.19598
98	.63487	-.63113	.47783
99	.63487	-.65562	.40985
100	.71548	-.44945	.43329
101	.71548	-.45892	.41324
102	.83333	-.31069	.39949
103	.83333	-.31476	.39587
104	.95118	-.15638	.53928
105	.95118	-.15755	.54041

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 12.000 DEG.

AND AILERON ANGLE = 0.000 DEG.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	.05022	-.95118	.49959	.49959
2	.37488	-.95118	.05853	.05853
3	.69954	-.95118	.01639	.01639
4	.78641	-.95118	.00857	.00857
5	.96335	-.95118	.00295	.00295
6	.05022	-.83333	.84576	.84576
7	.37488	-.83333	.16977	.16977
8	.69954	-.83333	.04480	.04480
9	.78641	-.83333	.02783	.02783
10	.96335	-.83333	.00886	.00886
11	.05022	-.71548	1.07097	1.07097
12	.37488	-.71548	.28396	.28396
13	.69954	-.71548	.08981	.08981
14	.78641	-.71548	.05325	.05325
15	.96335	-.71548	.01608	.01608
16	.05022	-.64129	1.54058	1.54058
17	.37488	-.64129	.35071	.35071
18	.69954	-.64129	.10904	.10904
19	.78641	-.64129	.08206	.08206
20	.96335	-.64129	.02462	.02462
21	.05022	-.56904	1.62667	1.62667
22	.37488	-.56904	.42023	.42023
23	.69954	-.56904	.16831	.16831
24	.78641	-.56904	.10607	.10607
25	.96335	-.56904	.03870	.03870
26	.05022	-.46089	1.69394	1.69394
27	.37488	-.46089	.45858	.45858
28	.69954	-.46089	.19813	.19813
29	.78641	-.46089	.13869	.13869
30	.96335	-.46089	.05410	.05410
31	.05022	-.33333	1.67911	1.67911
32	.37488	-.33333	.49135	.49135
33	.69954	-.33333	.22322	.22322
34	.78641	-.33333	.15964	.15964
35	.96335	-.33333	.06535	.06535
36	.05022	-.20577	1.58515	1.58515
37	.37488	-.20577	.51370	.51370
38	.69954	-.20577	.25310	.25310
39	.78641	-.20577	.18280	.18280
40	.96335	-.20577	.07623	.07623

41	.05022	-.09763	1.41918	1.41918
42	.37488	-.09763	.53383	.53383
43	.69954	-.09763	.29204	.29204
44	.78641	-.09763	.21495	.21495
45	.96335	-.09763	.09266	.09266
46	.05022	-.02537	1.27368	1.27368
47	.37488	-.02537	.55062	.55062
48	.69954	-.02537	.30387	.30387
49	.78641	-.02537	.26232	.26232
50	.96335	-.02537	.11806	.11806
51	.05022	.03186	1.28377	1.28377
52	.37488	.03186	.55039	.55039
53	.69954	.03186	.30969	.30969
54	.78641	.03186	.25581	.25581
55	.96335	.03186	.11703	.11703
56	.05022	.11527	1.45768	1.45768
57	.37488	.11527	.53493	.53493
58	.69954	.11527	.29248	.29248
59	.78641	.11527	.21737	.21737
60	.96335	.11527	.09548	.09548
61	.05022	.21838	1.60695	1.60695
62	.37488	.21838	.52583	.52583
63	.69954	.21838	.27449	.27449
64	.78641	.21838	.20761	.20761
65	.96335	.21838	.09430	.09430
66	.05022	.30179	1.67733	1.67733
67	.37488	.30179	.52379	.52379
68	.69954	.30179	.29243	.29243
69	.78641	.30179	.24543	.24543
70	.96335	.30179	.10937	.10937
71	.05022	.36545	1.71145	1.71145
72	.37488	.36545	.52421	.52421
73	.69954	.36545	.39774	.39774
74	.78641	.36545	.34700	.34700
75	.96335	.36545	.11332	.11332
76	.05022	.44871	1.73390	1.73390
77	.37488	.44871	.52548	.52548
78	.69954	.44871	.44109	.44109
79	.78641	.44871	.36262	.36262
80	.96335	.44871	.11140	.11140
81	.05022	.55161	1.70883	1.70883
82	.37488	.55161	.51680	.51680
83	.69954	.55161	.42841	.42841
84	.78641	.55161	.33520	.33520
85	.96335	.55161	.09074	.09074
86	.05022	.63487	1.64726	1.64726
87	.37488	.63487	.47002	.47002
88	.69954	.63487	.33261	.33261
89	.78641	.63487	.26402	.26402

90	.96335	.63487	.05665	.05665
91	.05022	.71548	1.16985	1.16985
92	.37488	.71548	.38220	.38220
93	.69954	.71548	.18208	.18208
94	.78641	.71548	.10105	.10105
95	.96335	.71548	.02728	.02728
96	.05022	.83333	.95359	.95359
97	.37488	.83333	.22578	.22578
98	.69954	.83333	.06866	.06866
99	.78641	.83333	.04215	.04215
100	.96335	.83333	.01296	.01296
101	.05022	.95118	.56820	.56820
102	.37488	.95118	.07702	.07702
103	.69954	.95118	.02320	.02320
104	.78641	.95118	.01193	.01193
105	.96335	.95118	.00394	.00394

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
-.95118	.00231	.00231	-.00000	.01110	-.01086	.03262	0.00000
-.83333	.00467	.00467	-.00000	.02245	-.02196	.06599	0.00000
-.71548	.00754	.00754	-.00000	.03628	-.03549	.10662	0.00000
-.64129	.48175	.48175	-.19498	.07626	.02444	.22411	0.00000
-.56904	.54329	.54329	-.17342	.08473	.02886	.24899	0.00000
-.46089	.58399	.58399	-.09988	.08857	.03358	.26030	0.00000
-.33333	.60221	.60221	.00368	.08515	.04095	.25023	0.00000
-.20577	.60082	.60082	.10797	.07413	.05192	.21786	0.00000
-.09763	.58726	.58726	.18646	.05730	.06624	.16839	0.00000
-.02537	.57241	.57241	.23219	.03071	.09028	.09025	0.00000
.03186	.57536	.57536	.22794	.03557	.08593	.10454	0.00000
.11527	.59663	.59663	.17473	.06091	.06454	.17901	0.00000
.21838	.61998	.61998	.09470	.07596	.05412	.22323	0.00000
.30179	.64496	.64496	.01551	.08375	.05147	.24612	0.00000
.36545	.68504	.68504	-.06373	.08811	.06356	.25894	0.00000
.44871	.70068	.70068	-.15575	.09155	.06361	.26905	0.00000
.55161	.68363	.68363	-.25328	.09083	.05988	.26692	0.00000
.63487	.62018	.62018	-.29248	.08388	.05166	.24651	0.00000
.71548	.00873	.00873	-.00000	.04197	-.04106	.12335	0.00000
.83333	.00574	.00574	-.00000	.02763	-.02703	.08120	0.00000
.95118	.00291	.00291	-.00000	.01400	-.01369	.04114	0.00000

*** THE FOLLOWING ARE ATTACHED POTENTIAL FLOW RESULTS ***

TOTAL LIFT COEFFICIENT = .59804

TOTAL INDUCED DRAG COEFFICIENT = .04061

THE INDUCED DRAG PARAMETER = .11355

TOTAL PITCHING MOMENT COEFFICIENT = -.01216

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

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SUMMARY OF ATTACHED FLOW RESULTS AT ALPHA = 12.000 DEG., M = .270

****

CL(LS) = .59804 CLF = 0.00000 CL = .59804

CD(LS) = .04061 CDF = 0.00000 CD = .04061

CM(LS) = -.01216 CMF = 0.00000 CM = -.01216

****

THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

CLP = .58008 CLVLE = .10276 CLVSE = .00000 CLVAUG = 0.00000

CDP = .12510 CDVLE = .02184 CDVSE = .00000 CDVAUG = 0.00000

CMP = -.01216 CMVLE = .02108 CMVSE = -.00000 CMVAUG = 0.00000

CLDVP = 0.00000 CLDVV = 0.00000 CLF = 0.00000 CL = .68284

CDDVP = 0.00000 CDDVV = 0.00000 CDF = 0.00000 CD = .14694

CMDVP = 0.00000 CMDVV = 0.00000 CMF = 0.00000 CM = .00892

CAXP = .00177 CAXV = 0.00000

****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF 4.15600 AND A REFERENCE AREA OF 8.63617

THE LATERAL CONTROL PARAMETERS DUE TO AILERON DEFLECTION OF 0.000 DEG. AT M = .270

BASED ON STABILITY AXES, AND B/2 = 2.07800

ATTACHED-FLOW RESULTS CL = -.011812 CN = .007812 (WITH TIP-SUCTION EFFECT)

CL = -.010274 CN = .007485 (WITHOUT TIP-SUCTION EFFECT)

VORTEX-FLOW RESULTS CL = -.010895 CN = .010473 (WITH TIP-VORTEX EFFECT)

CL = -.010574 CN = .008204 (WITHOUT TIP-VORTEX EFFECT)

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON Q*S*(B/2),
WHERE S = 8.63617 AND B/2 = 3.11700
(FOR ATTACHED POTENTIAL FLOW ONLY)

Y/S	BM(RIGHT)	BM(LEFT)
-.95118	0.00000	.00009
-.83333	0.00000	.00126
-.71548	0.00000	.00512
-.64129	0.00000	.00776
-.56904	0.00000	.00927
-.46089	0.00000	.01558
-.33333	0.00000	.02954
-.20577	0.00000	.05089
-.09763	0.00000	.07467
-.02537	0.00000	.09348
.03186	.10588	0.00000
.11527	.08242	0.00000
.21838	.05772	0.00000
.30179	.04136	0.00000
.36545	.03096	0.00000
.44871	.02025	0.00000
.55161	.01206	0.00000
.63487	.00938	0.00000
.71548	.00613	0.00000
.83333	.00149	0.00000
.95118	.00011	0.00000

60

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = .115653 (RIGHT), = .100610 (LEFT)

3. Sample Case 3

Input Data

```
     F-106B WITH RUDDER
       1         0         0         2
      -1         0         1         1
       1        10         1         0         0
       1         1         0         0         0         0         0
0.000000
       7         0         2         0         0
       0
2.185390  5.292990   .250450  5.143500  5.143500  1.958300  -.144600  0.000000
       3         2         5         2         3         0         0
       1         2         1         0         0         1         1
9.391000
       3         2         0         0         0
       0
4.268300  5.626240  0.000000  4.553930  5.699020   .200000   .289200 90.000000
       0
4.553930  5.699020   .200000  5.298540  5.888740   .721390   .289200 90.000000
       0
5.298540  5.888740   .721390  5.711000  5.993840  1.010200   .289200 90.000000
       0
5.626240  5.845300  0.000000  5.699020  5.918080   .200000   .289200 90.000000
       0
5.699020  5.918080   .200000  5.888740  6.107800   .721390   .289200 90.000000
       0
5.888740  6.107800   .721390  5.993840  6.212900  1.010200   .289200 90.000000
0.000000  3.489150  2.376000  1.958300  3.535600  0.000000
2.000000  0.000000  0.000000  0.000000
30.000000 20.000000
0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000
       0
 .001763
0.000000  0.000000  0.000000
       0
 .001763
0.000000  0.000000  0.000000
0.000000  0.000000
       1         2         7        15
-.374200  5.928300  0.000000  0.000000  0.000000  1.000000
```

Note. Total number of unknowns = 10x(7+0) + (2+5+2)x(3+2) + 15x2 = 145.

Output

```
**************************************
      F-106R WITH RUDDER
**************************************
        1         0         0         2
**************************************
CASE NUMBER =  1
**************************************

INPUT DATA
        -1         0         1         1
         1        10         1         0         0
         1         1         0         0         0         0         0
 0.000000
         7         0         2         0         0
         0
 2.185390  5.292990   .250450  5.143500  5.143500  1.958300 -.144600  0.000000
         3         2         5         2         3         0         0
         1         2         1         0         0         1         1
 9.391000
         3         2         0         0         0
         0
 4.268300  5.626240  0.000000  4.553930  5.699020   .200000  .289200 90.000000
         0
 4.553930  5.699020   .200000  5.298540  5.888740   .721390  .289200 90.000000
         0
 5.298540  5.888740   .721390  5.711000  5.993840  1.010200  .289200 90.000000
         0
 5.626240  5.845300  0.000000  5.699020  5.918080   .200000  .289200 90.000000
         0
 5.699020  5.918080   .200000  5.888740  6.107800   .721390  .289200 90.000000
         0
 5.888740  6.107800   .721390  5.993840  6.212900  1.010200  .289200 90.000000
 0.000000  3.489150  2.376000  1.958300  3.535600  0.000000
 2.000000  0.000000  0.000000  0.000000
30.000000 20.000000
 0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000  0.000000
         0
  .001763
 0.000000  0.000000  0.000000
         0
  .001763
 0.000000  0.000000  0.000000
 0.000000  0.000000
         1         2         7        15
 -.374200  5.928300  0.000000  0.000000  0.000000  1.000000
         HALF SV=  .34892E+01          CREF=  .23760E+01

VORTEX ELEMENT ENDPOINT COORDINATES=
```

ORIGINAL PAGE IS
OF POOR QUALITY

X1	X2	Y1	Y2	Z1	Z2
2.22435	2.35625	.25045	.32762	-.14460	-.14460
2.52438	2.64272	.25045	.32762	-.14460	-.14460
3.06502	3.15894	.25045	.32762	-.14460	-.14460
3.73919	3.80264	.25045	.32762	-.14460	-.14460
4.41336	4.44635	.25045	.32762	-.14460	-.14460
4.95400	4.96256	.25045	.32762	-.14460	-.14460
5.25403	5.24904	.25045	.32762	-.14460	-.14460
2.35625	2.58085	.32762	.45902	-.14460	-.14460
2.64272	2.84424	.32762	.45902	-.14460	-.14460
3.15894	3.31886	.32762	.45902	-.14460	-.14460
3.80264	3.91069	.32762	.45902	-.14460	-.14460
4.44635	4.50253	.32762	.45902	-.14460	-.14460
4.96256	4.97714	.32762	.45902	-.14460	-.14460
5.24904	5.24053	.32762	.45902	-.14460	-.14460
2.58085	2.89482	.45902	.64271	-.14460	-.14460
2.84424	3.12594	.45902	.64271	-.14460	-.14460
3.31886	3.54241	.45902	.64271	-.14460	-.14460
3.91069	4.06173	.45902	.64271	-.14460	-.14460
4.50253	4.58106	.45902	.64271	-.14460	-.14460
4.97714	4.99752	.45902	.64271	-.14460	-.14460
5.24053	5.22865	.45902	.64271	-.14460	-.14460
2.89482	3.27271	.64271	.86380	-.14460	-.14460
3.12594	3.46499	.64271	.86380	-.14460	-.14460
3.54241	3.81147	.64271	.86380	-.14460	-.14460
4.06173	4.24353	.64271	.86380	-.14460	-.14460
4.58106	4.67558	.64271	.86380	-.14460	-.14460
4.99752	5.02206	.64271	.86380	-.14460	-.14460
5.22865	5.21434	.64271	.86380	-.14460	-.14460
3.27271	3.68392	.86380	1.10437	-.14460	-.14460
3.46499	3.83394	.86380	1.10437	-.14460	-.14460
3.81147	4.10426	1.10437	1.34495	-.14460	-.14460
4.24353	4.44134	1.10437	1.34495	-.14460	-.14460
4.67558	4.77843	1.10437	1.34495	-.14460	-.14460
5.02206	5.04875	1.10437	1.34495	-.14460	-.14460
5.21434	5.19877	1.10437	1.34495	-.14460	-.14460
3.68392	4.09513	1.34495	1.56604	-.14460	-.14460
3.83394	4.20289	1.34495	1.56604	-.14460	-.14460
4.10426	4.39705	1.34495	1.56604	-.14460	-.14460
4.44134	4.63916	1.34495	1.56604	-.14460	-.14460
4.77843	4.88128	1.34495	1.56604	-.14460	-.14460
5.04875	5.07544	1.34495	1.56604	-.14460	-.14460
5.19877	5.18320	1.34495	1.56604	-.14460	-.14460
4.09513	4.47303	1.34495	1.56604	-.14460	-.14460
4.20289	4.54194	1.34495	1.56604	-.14460	-.14460
4.39705	4.66612	1.34495	1.56604	-.14460	-.14460
4.63916	4.82096	1.34495	1.56604	-.14460	-.14460
4.88128	4.97580	1.34495	1.56604	-.14460	-.14460

5.07544	5.09998	1.34495	1.56604	-.14460	-.14460
5.18320	5.16889	1.34495	1.56604	-.14460	-.14460
4.47303	4.78700	1.56604	1.74973	-.14460	-.14460
4.54194	4.82364	1.56604	1.74973	-.14460	-.14460
4.66612	4.88967	1.56604	1.74973	-.14460	-.14460
4.82096	4.97200	1.56604	1.74973	-.14460	-.14460
4.97580	5.05433	1.56604	1.74973	-.14460	-.14460
5.09998	5.12036	1.56604	1.74973	-.14460	-.14460
5.16889	5.15700	1.56604	1.74973	-.14460	-.14460
4.78700	5.01160	1.74973	1.88113	-.14460	-.14460
4.82364	5.02516	1.74973	1.88113	-.14460	-.14460
4.88967	5.04959	1.74973	1.88113	-.14460	-.14460
4.97200	5.08005	1.74973	1.88113	-.14460	-.14460
5.05433	5.11051	1.74973	1.88113	-.14460	-.14460
5.12036	5.13494	1.74973	1.88113	-.14460	-.14460
5.15700	5.14849	1.74973	1.88113	-.14460	-.14460
5.01160	5.12864	1.88113	1.94961	-.14460	-.14460
5.02516	5.13017	1.88113	1.94961	-.14460	-.14460
5.04959	5.13292	1.88113	1.94961	-.14460	-.14460
5.08005	5.13635	1.88113	1.94961	-.14460	-.14460
5.11051	5.13978	1.88113	1.94961	-.14460	-.14460
5.13494	5.14254	1.88113	1.94961	-.14460	-.14460
5.14849	5.14406	1.88113	1.94961	-.14460	-.14460
4.35926	4.49495	0.00000	.10000	.28920	.28920
4.94727	5.03687	0.00000	.10000	.28920	.28920
5.53528	5.57879	0.00000	.10000	.28920	.28920
4.49495	4.63064	.10000	.20000	.28920	.28920
5.03687	5.12647	.10000	.20000	.28920	.28920
5.57879	5.62231	.10000	.20000	.28920	.28920
4.63064	4.73424	.20000	.27636	.28920	.28920
5.12647	5.19489	.20000	.27636	.28920	.28920
5.62231	5.65554	.20000	.27636	.28920	.28920
4.73424	4.89281	.27636	.39322	.28920	.28920
5.19489	5.29960	.27636	.39322	.28920	.28920
5.65554	5.70640	.27636	.39322	.28920	.28920
4.89281	5.07591	.39322	.52817	.28920	.28920
5.29960	5.42051	.39322	.52817	.28920	.28920
5.70640	5.76512	.39322	.52817	.28920	.28920
5.07591	5.23447	.52817	.64503	.28920	.28920
5.42051	5.52523	.52817	.64503	.28920	.28920
5.76512	5.81598	.52817	.64503	.28920	.28920
5.23447	5.33808	.64503	.72139	.28920	.28920
5.52523	5.59364	.64503	.72139	.28920	.28920
5.81598	5.84920	.64503	.72139	.28920	.28920
5.33808	5.53401	.72139	.86579	.28920	.28920
5.59364	5.72303	.72139	.86579	.28920	.28920
5.84920	5.91205	.72139	.86579	.28920	.28920
5.53401	5.70370	.86579	.99085	.28920	.28920
5.72303	5.83509	.86579	.99085	.28920	.28920

5.91205	5.96647	.86579	.99085	.28920	.28920
5.65832	5.69471	0.00000	.10000	.28920	.28920
5.81322	5.84961	0.00000	.10000	.28920	.28920
5.69471	5.73110	.10000	.20000	.28920	.28920
5.84961	5.88600	.10000	.20000	.28920	.28920
5.73110	5.75888	.20000	.27636	.28920	.28920
5.88600	5.91378	.20000	.27636	.28920	.28920
5.75888	5.80141	.27636	.39322	.28920	.28920
5.91378	5.95631	.27636	.39322	.28920	.28920
5.80141	5.85051	.39322	.52817	.28920	.28920
5.95631	6.00541	.39322	.52817	.28920	.28920
5.85051	5.89304	.52817	.64503	.28920	.28920
6.00541	6.04794	.52817	.64503	.28920	.28920
5.89304	5.92082	.64503	.72139	.28920	.28920
6.04794	6.07572	.64503	.72139	.28920	.28920
5.92082	5.97337	.72139	.86579	.28920	.28920
6.07572	6.12827	.72139	.86579	.28920	.28920
5.97337	6.01888	.86579	.99085	.28920	.28920
6.12827	6.17378	.86579	.99085	.28920	.28920

CONTROL POINT COORDINATES-

XCP	YCP	ZCP	XCP	YCP	ZCP
2.39606	.28504	-.14460	2.81847	.28504	-.14460
3.42888	.28504	-.14460	4.10638	.28504	-.14460
4.71679	.28504	-.14460	5.13920	.28504	-.14460
5.28996	.28504	-.14460	2.56185	.38601	-.14460
2.95877	.38601	-.14460	3.53235	.38601	-.14460
4.16896	.38601	-.14460	4.74254	.38601	-.14460
5.13946	.38601	-.14460	5.28112	.38601	-.14460
2.82319	.54517	-.14460	3.17992	.54517	-.14460
3.69544	.54517	-.14460	4.26762	.54517	-.14460
4.78313	.54517	-.14460	5.13987	.54517	-.14460
5.26719	.54517	-.14460	3.15892	.74964	-.14460
3.46405	.74964	-.14460	3.90497	.74964	-.14460
4.39435	.74964	-.14460	4.83527	.74964	-.14460
5.14040	.74964	-.14460	5.24930	.74964	-.14460
3.54184	.98285	-.14460	3.78809	.98285	-.14460
4.14394	.98285	-.14460	4.53890	.98285	-.14460
4.89474	.98285	-.14460	5.14100	.98285	-.14460
5.22888	.98285	-.14460	3.94092	1.22590	-.14460
4.12582	1.22590	-.14460	4.39300	1.22590	-.14460
4.68955	1.22590	-.14460	4.95673	1.22590	-.14460
5.14162	1.22590	-.14460	5.20761	1.22590	-.14460
4.32384	1.45911	-.14460	4.44986	1.45911	-.14460
4.63197	1.45911	-.14460	4.83409	1.45911	-.14460
5.01620	1.45911	-.14460	5.14222	1.45911	-.14460
5.18719	1.45911	-.14460	4.65957	1.66358	-.14460
4.73398	1.66358	-.14460	4.84149	1.66358	-.14460

```
   4.96083   1.66358   -.14460   5.06834   1.66358   -.14460
   5.14274   1.66358   -.14460   5.16930   1.66358   -.14460
   4.92092   1.82274   -.14460   4.95514   1.82274   -.14460
   5.00459   1.82274   -.14460   5.05948   1.82274   -.14460
   5.10893   1.82274   -.14460   5.14315   1.82274   -.14460
   5.15537   1.82274   -.14460   5.08670   1.92371   -.14460
   5.09544   1.92371   -.14460   5.10806   1.92371   -.14460
   5.12206   1.92371   -.14460   5.13468   1.92371   -.14460
   5.14341   1.92371   -.14460   5.14653   1.92371   -.14460
   4.66589    .05000    .28920   5.31825    .05000    .28920
   5.64443    .05000    .28920   4.78210    .15000    .28920
   5.38125    .15000    .28920   5.68082    .15000    .28920
   4.88079    .23493    .28920   5.43475    .23493    .28920
   5.71173    .23493    .28920   4.99167    .33035    .28920
   5.49486    .33035    .28920   5.74645    .33035    .28920
   5.14315    .46069    .28920   5.57697    .46069    .28920
   5.79388    .46069    .28920   5.29462    .59104    .28920
   5.65908    .59104    .28920   5.84131    .59104    .28920
   5.40550    .68646    .28920   5.71919    .68646    .28920
   5.87603    .68646    .28920   5.52999    .79359    .28920
   5.78667    .79359    .28920   5.91501    .79359    .28920
   5.69780    .93800    .28920   5.87764    .93800    .28920
   5.96756    .93800    .28920   5.75396    .05000    .28920
   5.86349    .05000    .28920   5.79035    .15000    .28920
   5.89988    .15000    .28920   5.82126    .23493    .28920
   5.93079    .23493    .28920   5.85598    .33035    .28920
   5.96551    .33035    .28920   5.90341    .46069    .28920
   6.01294    .46069    .28920   5.95084    .59104    .28920
   6.06037    .59104    .28920   5.98556    .68646    .28920
   6.09509    .68646    .28920   6.02454    .79359    .28920
   6.13407    .79359    .28920   6.07709    .93800    .28920
   6.18662    .93800    .28920
*****************************************
 ANGLE OF ATTACK =  30.000  DEG.
*****************************************

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

     X/C       CTIP
    .04163    .00000
    .31074    .00000
    .57986    .00000
    .67692    .00000
    .94457    .00000

TIP SUCTION COEFFICIENT=     .00000  (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION =    -.00000
```

ELEMENT	Y/S	GAMMA	GAMAX
1	.14555	-.11538	2.18373
2	.14555	-.40910	.75729
3	.14555	-.74261	.63255
4	.14555	-1.06014	.25161
5	.14555	-1.30538	.17028
6	.14555	-1.41822	.05030
7	.14555	-1.44828	.07864
8	.19711	-.14606	3.38866
9	.19711	-.44483	.89608
10	.19711	-.75956	.43505
11	.19711	-1.06880	.30311
12	.19711	-1.29869	.21972
13	.19711	-1.40801	.17457
14	.19711	-1.43550	.16871
15	.27839	-.15283	4.10722
16	.27839	-.47272	1.29813
17	.27839	-.78866	.61852
18	.27839	-1.06883	.42597
19	.27839	-1.27352	.34346
20	.27839	-1.37200	.30068
21	.27839	-1.39783	.29245
22	.38280	-.15440	4.87106
23	.38280	-.47496	1.66328
24	.38280	-.78203	.91072
25	.38280	-1.03712	.60715
26	.38280	-1.21550	.47097
27	.38280	-1.30218	.41513
28	.38280	-1.32540	.40794
29	.50189	-.14673	5.75711
30	.50189	-.44729	2.03638
31	.50189	-.73259	1.17875
32	.50189	-.96257	.80083
33	.50189	-1.11694	.63846
34	.50189	-1.19222	.56754
35	.50189	-1.21239	.55897
36	.62600	-.13027	6.78244
37	.62600	-.39147	2.41654
38	.62600	-.64205	1.51188
39	.62600	-.84393	1.04477
40	.62600	-.97462	.82301
41	.62600	-1.03898	.73910
42	.62600	-1.05572	.72793
43	.74509	-.10561	8.09568
44	.74509	-.31649	2.88826
45	.74509	-.51547	1.85832
46	.74509	-.68024	1.38885
47	.74509	-.79064	1.11848
48	.74509	-.84337	1.01002

49	.74509	-.85729	.99109
50	.84950	-.07656	9.92151
51	.84950	-.22812	3.54392
52	.84950	-.37097	2.30060
53	.84950	-.48936	1.74356
54	.84950	-.56961	1.47088
55	.84950	-.60983	1.34800
56	.84950	-.62080	1.32895
57	.93078	-.04583	12.93229
58	.93078	-.13626	4.64200
59	.93078	-.22153	3.09581
60	.93078	-.29334	2.40286
61	.93078	-.34240	2.01852
62	.93078	-.36665	1.87361
63	.93078	-.37323	1.85479
64	.98234	-.01756	19.39938
65	.98234	-.05222	6.94831
66	.98234	-.08510	4.63923
67	.98234	-.11383	3.66237
68	.98234	-.13476	3.08994
69	.98234	-.14559	2.79437
70	.98234	-.14854	2.74700
71	.04950	-.00000	.00000
72	.04950	-.00000	.00000
73	.04950	-.00000	-.00000
74	.14849	-.00000	.00000
75	.14849	-.00000	.00000
76	.14849	-.00000	-.00000
77	.23255	-.00000	.00000
78	.23255	-.00000	.00000
79	.23255	-.00000	-.00000
80	.32701	-.00000	.00000
81	.32701	-.00000	.00000
82	.32701	-.00000	.00000
83	.45604	-.00000	.00000
84	.45604	-.00000	.00000
85	.45604	-.00000	.00000
86	.58507	-.00000	.00000
87	.58507	-.00000	.00000
88	.58507	-.00000	.00000
89	.67953	-.00000	.00000
90	.67953	-.00000	.00000
91	.67953	-.00000	.00000
92	.78558	-.00000	.00000
93	.78558	-.00000	.00000
94	.78558	-.00000	.00000
95	.92853	-.00000	.00000
96	.92853	-.00000	.00000
97	.92853	-.00000	.00000

98	.04950	-.00000	-.00000
99	.04950	-.00000	-.00000
100	.14849	-.00000	-.00000
101	.14849	-.00000	-.00000
102	.23255	-.00000	-.00000
103	.23255	-.00000	-.00000
104	.32701	-.00000	.00000
105	.32701	-.00000	.00000
106	.45604	-.00000	.00000
107	.45604	-.00000	.00000
108	.58507	-.00000	.00000
109	.58507	-.00000	.00000
110	.67953	-.00000	.00000
111	.67953	-.00000	.00000
112	.78558	-.00000	.00000
113	.78558	-.00000	.00000
114	.92853	-.00000	.00000
115	.92853	-.00000	.00000

VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER 1 ***

(FOR CAMBERED WING)

CENTROID TO MAX. SUCTION FORCE, YBAR = .34262

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)= .97800

L.E. LENGTH OF MAX. SUCTION CENTROID = .85339

***FOR SURFACE NUMBER 1 ***

(FOR NONCAMBERED WING)

CENTROID TO MAX. SUCTION FORCE, YBAR = .37806

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)= 1.28041

L.E. LENGTH OF MAX. SUCTION CENTROID = .91522

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 17.51495 DEG.
(WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

***FOR SURFACE NUMBER 2 ***

(FOR NONCAMBERED WING)

****

***THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E. HAVE BEEN CORRECTED FOR

CAMBER AND ADVERSE PRESSUPE GPADIENT IN VORTEX LIFT AUGMENTATION, IF ANY***

***FOR SURFACE NUMBER 1 ***

REVISED ALPHA BDTE = 21.603DEGRFFS
(FOR SYMMETRICAL LOADING)

***FOR SURFACE NUMBER 2 ***

REVISED ALPHA BDTE = 90.000DEGREES
(FOR SYMMETRICAL LOADING)

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 30.000 DEG.

AND AILERON ANGLE = 9.391 DEG.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	.01254	.14555	3.32732	3.32743
2	.10908	.14555	1.34514	1.34541
3	.28306	.14555	.92167	.92224
4	.50000	.14555	.75692	.75850
5	.71694	.14555	.49797	.50009
6	.89092	.14555	.24789	.24807
7	.98746	.14555	.06812	.06913
8	.01254	.19711	4.44523	4.44586
9	.10908	.19711	1.32452	1.32513
10	.28306	.19711	.95970	.96084
11	.50000	.19711	.76336	.76603
12	.71694	.19711	.50291	.50549
13	.89092	.19711	.25296	.25338
14	.98746	.19711	.07117	.07173
15	.01254	.27839	5.37689	5.37894
16	.10908	.27839	1.56487	1.56617
17	.28306	.27839	1.00463	1.00666
18	.50000	.27839	.75415	.75755
19	.71694	.27839	.50055	.50322
20	.89092	.27839	.25828	.25908
21	.98746	.27839	.07713	.07734
22	.01254	.38280	6.45060	6.45570
23	.10908	.38280	1.94550	1.94808
24	.28306	.38280	1.10742	1.11054
25	.50000	.38280	.77669	.78044
26	.71694	.38280	.50954	.51234
27	.89092	.38280	.26980	.27101
28	.98746	.38280	.08224	.08253

29	.01254	.50189	7.65417	7.66484
30	.10908	.50189	2.44482	2.44940
31	.28306	.50189	1.26445	1.26859
32	.50000	.50189	.84409	.84806
33	.71694	.50189	.54445	.54743
34	.89092	.50189	.29168	.29327
35	.98746	.50189	.08961	.09008
36	.01254	.62600	9.05086	9.06958
37	.10908	.62600	2.98778	2.99491
38	.28306	.62600	1.62578	1.63100
39	.50000	.62600	.96335	.96762
40	.71694	.62600	.61501	.61818
41	.89092	.62600	.33001	.33185
42	.98746	.62600	.10157	.10216
43	.01254	.74509	10.81900	10.84768
44	.10908	.74509	3.64721	3.65744
45	.28306	.74509	2.09307	2.09975
46	.50000	.74509	1.30013	1.30505
47	.71694	.74509	.75230	.75575
48	.89092	.74509	.39499	.39699
49	.98746	.74509	.12130	.12194
50	.01254	.84950	13.28708	13.32798
51	.10908	.84950	4.54229	4.55650
52	.28306	.84950	2.72273	2.73159
53	.50000	.84950	1.78246	1.78859
54	.71694	.84950	1.14353	1.14764
55	.89092	.84950	.64276	.64506
56	.98746	.84950	.24896	.24969
57	.01254	.93078	17.31661	17.37475
58	.10908	.93078	5.98393	6.00399
59	.28306	.93078	3.72474	3.73722
60	.50000	.93078	2.57509	2.58368
61	.71694	.93078	1.72804	1.73362
62	.89092	.93078	1.06523	1.06828
63	.98746	.93078	.54941	.55035
64	.01254	.98234	26.02187	26.11346
65	.10908	.98234	9.06152	9.09323
66	.28306	.98234	5.80113	5.82127
67	.50000	.98234	4.29589	4.31059
68	.71694	.98234	3.10479	3.11497
69	.89092	.98234	1.99055	1.99620
70	.98746	.98234	1.08354	1.08528
71	.05736	.04950	-.05672	.05672
72	.42812	.04950	-.03983	.03983
73	.79888	.04950	-.08122	.08122
74	.87729	.04950	-.05989	.05989
75	.97895	.04950	-.03533	.03533
76	.05663	.14849	-.08403	.08403
77	.42272	.14849	-.03678	.03678

78	.78881	.14849	-.09952	.09952
79	.86808	.14849	-.09464	.09464
80	.97737	.14849	-.04697	.04697
81	.05593	.23255	-.16240	.16240
82	.41746	.23255	-.00910	.00910
83	.77809	.23255	-.13858	.13858
84	.85909	.23255	-.30283	.30283
85	.97582	.23255	-.06128	.06128
86	.05501	.32701	-.21773	.21773
87	.41062	.32701	.00321	-.00321
88	.76623	.32701	-.18216	.18216
89	.84742	.32701	-.35198	.35198
90	.97382	.32701	-.07158	.07158
91	.05348	.45604	-.26667	.26667
92	.30921	.45604	.00474	-.00474
93	.74493	.45604	-.20878	.20878
94	.82704	.45604	-.36970	.36970
95	.97048	.45604	-.07361	.07361
96	.05151	.58507	-.29814	.29814
97	.38446	.58507	-.00033	.00033
98	.71741	.58507	-.20406	.20406
99	.80276	.58507	-.35813	.35813
100	.96616	.58507	-.06252	.06252
101	.04965	.67953	-.28898	.28898
102	.37060	.67953	-.01325	.01325
103	.69154	.67953	-.16505	.16505
104	.77910	.67953	-.29147	.29147
105	.96210	.67953	-.04272	.04272
106	.04695	.78558	-.18947	.18947
107	.35045	.78558	-.06923	.06923
108	.65396	.78558	-.08263	.08263
109	.74471	.78558	-.06795	.06795
110	.95620	.78558	-.02314	.02314
111	.04163	.92853	-.17523	.17523
112	.31074	.92853	-.04844	.04844
113	.57986	.92853	-.02939	.02939
114	.67692	.92853	-.02494	.02494
115	.94457	.92853	-.00922	.00922

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
.14555	.79161	.79059	.11765	.10132	.32205	.48322	0.00000
.19711	.87726	.87580	.09904	.15734	.29803	.72076	0.00000
.27830	.95622	.95409	.04994	.21451	.26811	.82341	0.00000
.38280	1.11278	1.10994	-.04378	.30576	.23667	.48775	0.00000
.50180	1.32647	1.32272	-.20025	.42644	.19358	.55987	0.00000
.62600	1.52917	1.52420	-.42913	.59352	.13327	.59216	0.00000
.74500	2.07498	2.06866	-.79014	.84507	.03211	.57980	0.00000
.84950	2.79252	2.77414	-1.30809	1.27252	-.17033	.51760	0.00000
.93078	3.98881	3.97704	-2.07452	2.15727	-.67983	.40360	0.00000

.98234	6.87681	6.85749	-3.55575	4.86758	-2.49347	.23210	0.00000

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

.04950	.05638	-.05638	-.00000	.00000	.00000	0.00000	0.00000
.14849	.06906	-.06906	-.00000	.00000	.00000	0.00000	0.00000
.23255	.10315	-.10315	-.00000	.00000	.00000	0.00000	0.00000
.32701	.12665	-.12665	-.00000	.00000	.00000	0.00000	0.00000
.45604	.14703	-.14703	-.00000	.00000	.00000	0.00000	0.00000
.58507	.15521	-.15521	-.00000	.00000	.00000	0.00000	0.00000
.67953	.14128	-.14128	-.00000	.00000	.00000	0.00000	0.00000
.78558	.09046	-.09046	-.00000	.00000	.00000	0.00000	0.00000
.92853	.05623	-.05623	-.00000	.00000	.00000	0.00000	0.00000

*** THE FOLLOWING ARE ATTACHED POTENTIAL FLOW RESULTS ***

TOTAL LIFT COEFFICIENT = .98398

TOTAL INDUCED DRAG COEFFICIENT = .14476

THE INDUCED DRAG PARAMETER = .14951

TOTAL PITCHING MOMENT COEFFICIENT = -.15309

THE WING LIFT COEFFICIENT = .98398

THE WING INDUCED DRAG COEFFICIENT = .14476

THE WING PITCHING MOMENT COEFFICIENT = -.15309

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.00000(BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000(BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 12.0 THETA 2= 36.0 THETA 3= 60.0 THETA 4= 84.0 THETA 5=108.0
THETA 6=135.0 THETA 7=165.0 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA
-.61762	.15855	-.01660	-.23000	-.30207	-.13605	.25690	.63504	
-.59589	-.06604	-.32037	-.63475	-.75365	-.53762	-.00098	.52088	
-.55337	-.03024	-.30592	-.65438	-.80765	-.61644	-.09292	.42607	
-.49193	.00996	-.26836	-.62489	-.79453	-.62768	-.13459	.36095	
-.41425	.04259	-.24125	-.60878	-.79416	-.64570	-.17218	.30963	
-.32373	.07548	-.20996	-.58325	-.78105	-.65147	-.20218	.26025	
-.22431	.15374	-.12577	-.50691	-.74453	-.65061	-.21143	.17010	
-.12036	.10229	-.06167	-.26032	-.29323	-.03787	.19665	.24454	
-.01640	.04483	-.03074	-.11560	-.07590	.09395	.24030	.30547	
.08301	.07620	.02772	-.00948	.02622	.15612	.27595	.31282	
.17354	.13226	.09584	.06637	.08253	.17411	.27120	.29259	
.25122	.17043	.14701	.12290	.14361	.20737	.25967	.27863	
.31246	.19020	.16755	.15760	.18309	.22500	.24428	.27112	
.35517	.21729	.19024	.17213	.19759	.21962	.22877	.25199	
.37600	.03125	.03761	.07917	.16836	.27406	.24973	.41404	

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ON LOCAL RADIUS

X/L	RADIUS	LOADING
-.05663	.00844	.80148
-.03490	.04304	.99010
.00761	.08913	.77953
.06905	.13936	.60799
.14673	.18797	.47169
.23726	.23019	.33804
.33667	.26240	.08151
.44063	.28232	.47586
.54458	.28919	.56318
.64400	.28920	.48163
.73452	.28920	.33348
.81220	.28920	.21881
.87364	.28920	.14191
.91615	.28920	.08553
.93789	.28920	.04276

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = .07645

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = .02147

THE FUSELAGE INDUCED DRAG COEFFICIENT = .03200

THE FUSELAGE LIFT COEFFICIENT = .07070

THE FUSELAGE MOMENT COEFFICIENT = .02412

THE FUSELAGE INDUCED DRAG COEFFICIENT = .03045

****

SUMMARY OF ATTACHED FLOW RESULTS AT ALPHA = 30.000 DEG., M = 0.000

****

CL(LS) =	.98398	CLF =	.07070	CL =	1.05467
CD(LS) =	.14476	CDF =	.03045	CD =	.17521
CM(LS) =	-.15309	CMF =	.02412	CM =	-.12896

****

THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

CLP =	.89337	CLVLE =	.23815	CLVSE =	0.00000	CLVAUG =	0.00000
CDP =	.36884	CDVLE =	.13750	CDVSE =	0.00000	CDVAUG =	0.00000
CMP =	-.15309	CMVLE =	-.00081	CMVSE =	0.00000	CMVAUG =	0.00000
CLDVP =	0.00000	CLDVV =	0.00000	CLF =	.07070	CL =	1.20222
CDDVP =	0.00000	CDDVV =	0.00000	CDF =	.03045	CD =	.53679
CMDVP =	0.00000	CMDVV =	0.00000	CMF =	.02412	CM =	-.12977
CAXP =	-.05645	CAXV =	0.00000				

****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF 3.91660 AND A REFERENCE AREA OF 6.97830

THE LATERAL CONTROL PARAMETERS DUE TO AILERON DEFLECTION OF 9.391 DEG. AT M = 0.000

BASED ON STABILITY AXES, AND B/2 = 1.95830

ATTACHED-FLOW RESULTS	CL =	.000791	CN =	.007616 (WITH TIP-SUCTION EFFECT)
	CL =	.000791	CN =	.007616 (WITHOUT TIP-SUCTION EFFECT)
VORTEX-FLOW RESULTS	CL =	.000600	CN =	.008224 (WITH TIP-VORTEX EFFECT)
	CL =	.000593	CN =	.008171 (WITHOUT TIP-VORTEX EFFECT)

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON Q*S*(B/2),
WHERE S = 6.97830 AND B/2 = 1.95830
(FOR ATTACHED POTENTIAL FLOW ONLY)

Y/S	BM(RIGHT)	BM(LEFT)
.14565	.17321	.17270
.19711	.14940	.14916
.27830	.11415	.11580
.38280	.07980	.07956
.50189	.04736	.04722
.62600	.02332	.02325
.74509	.00892	.00889
.84950	.00232	.00231
.93078	.00032	.00031
.98234	.00001	.00001

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = .181715 (RIGHT), = .181186 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING GEOMETRY,
WHERE S = 6.97830 AND B/2 = 1.01020

*** TAIL SURFACE 1 ***

.04950	.00590	-.00590
.14849	.00453	-.00453
.23255	.00347	-.00347
.32701	.00242	-.00242
.45604	.00132	-.00132
.58507	.00059	-.00059
.67953	.00029	-.00029
.78558	.00011	-.00011
.92853	.00000	-.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = .006637 (RIGHT), = -.006637 (LEFT)

****
ANGLE OF ATTACK = 20.000 DEG.
****

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
.04163	.00000
.31074	.00000
.57086	.00000
.67692	.00000
.94457	.00000

TIP SUCTION COEFFICIENT= .00000 (ONE SIDE ONLY)

THE Y-COORDINATE OF CENTROID OF TIP SUCTION = -.00000

ELEMENT	Y/S	GAMMA	GAMAY
1	.14555	-.07806	1.47124
2	.14555	-.27734	.50805
3	.14555	-.50510	.42460
4	.14555	-.72268	.16827
5	.14555	-.89029	.12051
6	.14555	-.96733	.03769
7	.14555	-.98785	.05695
8	.19711	-.09849	2.29780
9	.19711	-.30144	.61911
10	.19711	-.51683	.29037
11	.19711	-.72854	.20978
12	.19711	-.88549	.14915
13	.19711	-.96030	.11904
14	.19711	-.97910	.11465
15	.27839	-.10161	2.75540
16	.27839	-.31943	.90021

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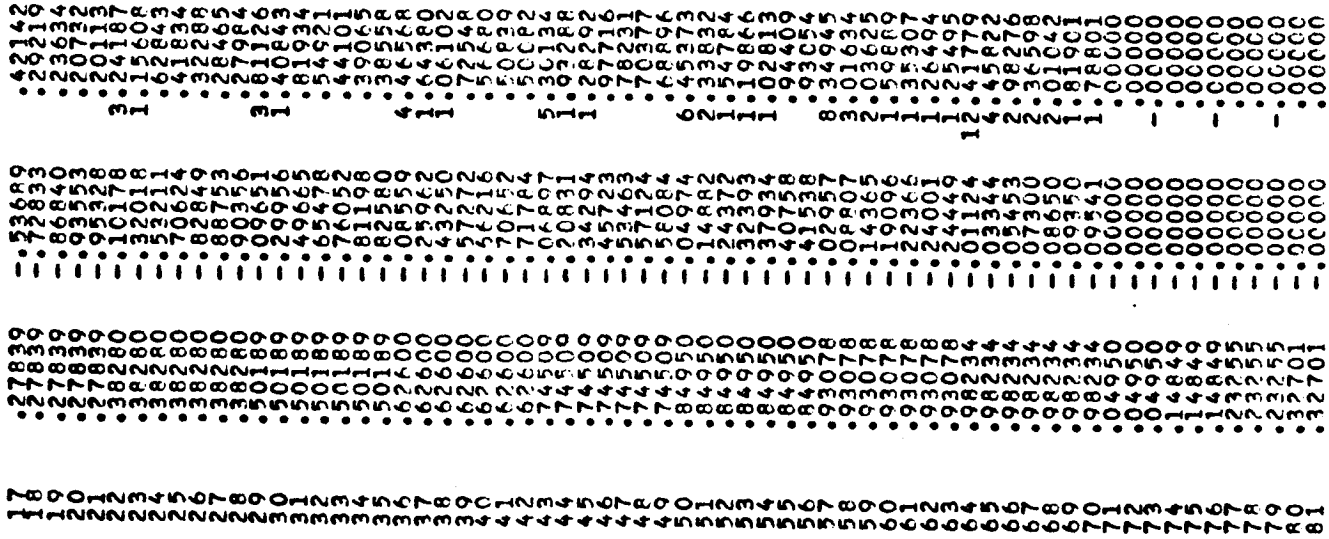

82	.32701	-.00000	.00000
83	.45604	-.00000	.00000
84	.45604	-.00000	.00000
85	.45604	-.00000	.00000
86	.58507	-.00000	.00000
87	.58507	-.00000	.00000
88	.58507	-.00000	.00000
89	.67953	-.00000	.00000
90	.67953	-.00000	.00000
91	.67953	-.00000	.00000
92	.78558	-.00000	.00000
93	.78558	-.00000	.00000
94	.78558	-.00000	.00000
95	.92853	-.00000	.00000
96	.92853	-.00000	.00000
97	.92853	-.00000	.00000
98	.04950	-.00000	-.00000
99	.04950	-.00000	-.00000
100	.14849	-.00000	-.00000
101	.14849	-.00000	-.00000
102	.23255	-.00000	-.00000
103	.23255	-.00000	-.00000
104	.32701	-.00000	.00000
105	.32701	-.00000	.00000
106	.45604	-.00000	.00000
107	.45604	-.00000	.00000
108	.58507	-.00000	.00000
109	.58507	-.00000	.00000
110	.67953	-.00000	.00000
111	.67953	-.00000	.00000
112	.78558	-.00000	.00000
113	.78558	-.00000	.00000
114	.92853	-.00000	.00000
115	.92853	-.00000	.00000

****

THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E. HAVE BEEN CORRECTED FOR CAMBER AND ADVERSE PRESSURE GRADIENT IN VORTEX LIFT AUGMENTATION, IF ANY

***FOR SURFACE NUMBER 1 ***

REVISED ALPHA BDTE = 21.603DEGREES
(FOR SYMMETRICAL LOADING)

***FOR SURFACE NUMBER 2 ***

REVISED ALPHA BDTE = 90.000DEGREES
(FOR SYMMETRICAL LOADING)

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 20.000 DEG.

AND AILERON ANGLE = 9.391 DEG.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	.01254	.14555	2.29934	2.29946
2	.10908	.14555	.99303	.99334
3	.28306	.14555	.68501	.68568
4	.50000	.14555	.56182	.56368
5	.71694	.14555	.36839	.37089
6	.89092	.14555	.18363	.18395
7	.98746	.14555	.05020	.05140
8	.01254	.19711	3.01274	3.01346

9	.10908	.19711	.98124	.98196
10	.28306	.19711	.71296	.71430
11	.50000	.19711	.56614	.56929
12	.71694	.19711	.37201	.37506
13	.89092	.19711	.18734	.18784
14	.98746	.19711	.05258	.05323
15	.01254	.27839	3.57440	3.57676
16	.10908	.27839	1.17028	1.17180
17	.28306	.27839	.74593	.74832
18	.50000	.27839	.55890	.56291
19	.71694	.27839	.37040	.37355
20	.89092	.27839	.19122	.19216
21	.98746	.27839	.05708	.05733
22	.01254	.38280	4.23668	4.24253
23	.10908	.38280	1.42532	1.42834
24	.28306	.38280	.82163	.82531
25	.50000	.38280	.57584	.58026
26	.71694	.38280	.37727	.38057
27	.89092	.38280	.10974	.20117
28	.98746	.38280	.06089	.06122
29	.01254	.50189	4.98272	4.99493
30	.10908	.50189	1.72600	1.73131
31	.28306	.50189	.94627	.95115
32	.50000	.50189	.62692	.63159
33	.71694	.50189	.40357	.40708
34	.89092	.50189	.21610	.21797
35	.98746	.50189	.06637	.06692
36	.01254	.62600	5.84302	5.86445
37	.10908	.62600	2.03847	2.04669
38	.28306	.62600	1.19409	1.20020
39	.50000	.62600	.71740	.72243
40	.71694	.62600	.45738	.46112
41	.89092	.62600	.24516	.24733
42	.98746	.62600	.07538	.07606
43	.01254	.74509	6.93279	6.96559
44	.10908	.74509	2.41924	2.43100
45	.28306	.74509	1.46008	1.46873
46	.50000	.74509	.95573	.96148
47	.71694	.74509	.56949	.57354
48	.89092	.74509	.29512	.29748
49	.98746	.74509	.09041	.09117
50	.01254	.84950	8.44944	8.49620
51	.10908	.84950	2.94284	2.95913
52	.28306	.84950	1.81835	1.82856
53	.50000	.84950	1.22975	1.23685
54	.71694	.84950	.80957	.81435
55	.89092	.84950	.45925	.46194
56	.98746	.84950	.16798	.16883
57	.01254	.93078	10.91960	10.98606
58	.10908	.93078	3.79880	3.82176
59	.28306	.93078	2.39270	2.40701
60	.50000	.93078	1.67439	1.68427
61	.71694	.93078	1.12708	1.13352
62	.89092	.93078	.67798	.68149
63	.98746	.93078	.31282	.31392
64	.01254	.98234	16.26636	16.37105
65	.10908	.98234	5.66534	5.70160
66	.28306	.98234	3.62905	3.65208
67	.50000	.98234	2.68755	2.70438
68	.71694	.98234	1.92715	1.93880
69	.89092	.98234	1.19222	1.19870
70	.98746	.98234	.57763	.57963
71	.05736	.04950	-.06678	.06678
72	.42812	.04950	-.04689	.04689
73	.79888	.04950	-.09562	.09562

74	.87729	.04950	-.07051	.07051
75	.97895	.04950	-.04160	.04160
76	.05663	.14849	-.09893	.09893
77	.42272	.14849	-.04331	.04331
78	.78881	.14849	-.11717	.11717
79	.86808	.14849	-.11143	.11143
80	.97737	.14849	-.05530	.05530
81	.05593	.23255	-.19120	.19120
82	.41746	.23255	-.01072	.01072
83	.77899	.23255	-.16315	.16315
84	.85909	.23255	-.35654	.35654
85	.97582	.23255	-.07215	.07215
86	.05501	.32701	-.25635	.25635
87	.41062	.32701	.00378	-.00378
88	.76623	.32701	-.21447	.21447
89	.84742	.32701	-.41440	.41440
90	.97382	.32701	-.08427	.08427
91	.05348	.45604	-.31397	.31397
92	.39921	.45604	.00558	-.00558
93	.74493	.45604	-.24581	.24581
94	.82794	.45604	-.43528	.43528
95	.97048	.45604	-.08666	.08666
96	.05151	.58507	-.35101	.35101
97	.38446	.58507	-.00039	.00039
98	.71741	.58507	-.24025	.24025
99	.80276	.58507	-.42165	.42165
100	.96616	.58507	-.07361	.07361
101	.04965	.67953	-.34023	.34023
102	.37060	.67953	-.01560	.01560
103	.69154	.67953	-.19432	.19432
104	.77910	.67953	-.34316	.34316
105	.96210	.67953	-.05030	.05030
106	.04695	.78558	-.22307	.22307
107	.35045	.78558	-.08151	.08151
108	.65396	.78558	-.09728	.09728
109	.74471	.78558	-.08000	.08000
110	.95620	.78558	-.02724	.02724
111	.04163	.92853	-.20630	.20630
112	.31074	.92853	-.05703	.05703
113	.57986	.92853	-.03460	.03460
114	.67692	.92853	-.02936	.02936
115	.94457	.92853	-.01085	.01085

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
.14555	.60193	.60073	.08275	.04642	.15877	.18023	0.00000
.19711	.65097	.64914	.06722	.07207	.14343	.27783	0.00000
.27839	.70206	.69957	.03062	.09388	.13416	.27605	0.00000
.38280	.79718	.79385	-.03783	.13225	.11595	.34444	0.00000
.50189	.92625	.92187	-.14936	.18407	.09077	.40150	-.00036
.62600	1.10605	1.10037	-.31469	.25463	.05474	.42538	-.00140
.74509	1.36264	1.35531	-.54946	.35987	-.00592	.41508	-.00227
.84950	1.74088	1.73123	-.87296	.53642	-.12715	.36623	-.00250
.93078	2.34494	2.33145	-1.32825	.89744	-.39739	.27995	0.00000
.98234	3.74959	3.72750	-2.21689	1.99369	-1.25446	.15707	0.00000

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

.04950	.06638	-.06638	-.00000	.00000	.00000	0.00000	0.00000
.14849	.08131	-.08131	-.00000	.00000	.00000	0.00000	0.00000
.23255	.12144	-.12144	-.00000	.00000	.00000	0.00000	0.00000
.32701	.14911	-.14911	-.00000	.00000	.00000	0.00000	0.00000

.45604	.17311	-.17311	-.00000	.00000	.00000	0.00000	0.00000
.58507	.18274	-.18274	-.00000	.00000	.00000	0.00000	0.00000
.67953	.16633	-.16633	-.00000	.00000	.00000	0.00000	0.00000
.78558	.10651	-.10651	-.00000	.00000	.00000	0.00000	0.00000
.92853	.06621	-.06621	-.00000	.00000	.00000	0.00000	0.00000

*** THE FOLLOWING ARE ATTACHED POTENTIAL FLOW RESULTS ***

TOTAL LIFT COEFFICIENT = .68204

TOTAL INDUCED DRAG COEFFICIENT = .06645

THE INDUCED DRAG PARAMETER = .14285

TOTAL PITCHING MOMENT COEFFICIENT = -.10785

THE WING LIFT COEFFICIENT = .68204

THE WING INDUCED DRAG COEFFICIENT = .06645

THE WING PITCHING MOMENT COEFFICIENT = -.10785

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.00000(BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000(BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA
AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 12.0 THETA 2= 36.0 THETA 3= 60.0 THETA 4= 84.0 THETA 5=108.0
THETA 6=135.0 THETA 7=165.0 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA
-.61762	.16418	.09401	.01568	.00949	.11594	.32748	.52239	
-.59589	-.06261	-.16702	-.28747	-.30902	-.17233	.11303	.37947	
-.55337	-.05926	-.17675	-.31880	-.36367	-.24617	.02575	.28610	
-.49193	-.04185	-.16311	-.31355	-.37199	-.27206	-.02034	.22516	
-.41425	-.02503	-.15088	-.31014	-.38065	-.29425	-.05642	.17958	
-.32373	-.00554	-.13421	-.29089	-.38090	-.30814	-.08622	.13775	
-.22431	.04783	-.08540	-.26798	-.38358	-.34158	-.11344	.06559	
-.12036	.00559	-.08032	-.19157	-.23050	-.09184	.08804	.10909	
-.01640	-.03495	-.07929	-.12222	-.10453	.00618	.12084	.15482	
.08301	-.00993	-.03554	-.05703	-.03861	.04830	.13944	.16285	
.17354	.03086	.01189	-.00509	.00136	.06131	.13482	.14832	
.25122	.05885	.04783	.04208	.05291	.08690	.12669	.13811	
.31266	.07346	.06407	.06202	.07812	.10303	.11732	.13291	
.35517	.09322	.08109	.07386	.08309	.10043	.10696	.11924	
.37690	-.03518	-.02438	.00961	.07035	.13999	.19495	.23823	

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ON LOCAL RADIUS

X/L	RADIUS	LOADING
-.05663	.00844	.59526
-.03490	.04304	.73489

.00761	.08913	.57846
.06905	.13936	.45101
.14673	.18797	.34970
.23726	.23019	.25020
.33667	.26240	.05845
.44063	.28232	.30204
.54458	.28919	.39041
.64400	.28920	.33923
.73452	.28920	.23440
.81220	.28920	.15311
.87364	.28920	.11154
.91615	.28920	.05624
.93789	.28920	.02812

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = .05365

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = .01593

THE FUSELAGE INDUCED DRAG COEFFICIENT = .01492

THE FUSELAGE LIFT COEFFICIENT = .05193

THE FUSELAGE MOMENT COEFFICIENT = .01773

THE FUSELAGE INDUCED DRAG COEFFICIENT = .01420

****

SUMMARY OF ATTACHED FLOW RESULTS AT ALPHA = 20.000 DEG., M = 0.000

****

CL(LS) = .68204 CLF = .05193 CL = .73397

CD(LS) = .06645 CDF = .01420 CD = .08065

CM(LS) = -.10785 CMF = .01773 CM = -.09012

****

THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

CLP = .66445 CLVLE = .15777 CLVSE = 0.00000 CLVAUG = 0.00000

CDP = .14947 CDVLE = .05430 CDVSE = 0.00000 CDVAUG = 0.00000

CMP = -.10785 CMVLE = -.01191 CMVSE = 0.00000 CMVAUG = 0.00000

CLDVP = 0.00000 CLDVV = 0.00000 CLF = .05193 CL = .87415

CDDVP = 0.00000 CDDVV = 0.00000 CDF = .01420 CD = .21797

CMDVP = 0.00000 CMDVV = 0.00000 CMF = .01773 CM = -.10203

CAXP = -.03746 CAXV = -.00294

****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF 3.91660 AND A REFERENCE AREA OF 6.97830

THE LATERAL CONTROL PARAMETERS DUE TO AILERON DEFLECTION OF 9.391 DEG. AT M = 0.000

BASED ON STABILITY AXES, AND B/2 = 1.95830

ATTACHED-FLOW RESULTS CL = -.000580 CN = .009192 (WITH TIP-SUCTION EFFECT)

CL = -.000580 CN = .009192 (WITHOUT TIP-SUCTION EFFECT)

VORTEX-FLOW RESULTS CL = -.000767 CN = .009579 (WITH TIP-VORTEX EFFECT)
CL = -.000765 CN = .009517 (WITHOUT TIP-VORTEX EFFECT)

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON Q*S*(B/2),
WHERE S = 6.97830 AND B/2 = 1.95830
(FOR ATTACHED POTENTIAL FLOW ONLY)

Y/S	BM(RIGHT)	BM(LEFT)
.14555	.11698	.11639
.19711	.10051	.10000
.27839	.07736	.07696
.38280	.05250	.05222
.50189	.03065	.03049
.62600	.01477	.01469
.74509	.00549	.00546
.84950	.00138	.00137
.93078	.00018	.00018
.98234	.00000	.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = .122937 (RIGHT), = .122322 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING GEOMETRY,
WHERE S = 6.97830 AND B/2 = 1.01020

*** TAIL SURFACE 1 ***

.04950	.00695	-.00695
.14849	.00534	-.00534
.23255	.00408	-.00408
.32701	.00285	-.00285
.45604	.00155	-.00155
.58507	.00070	-.00070
.67953	.00034	-.00034
.78558	.00013	-.00013
.92853	.00000	-.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = .007815 (RIGHT), = -.007815 (LEFT)

REFERENCES

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10. White, R.P., Jr., "Wing-Vortex Lift at High Angles of Attack," Paper No. 9, AGARD CP-204, Prediction of Aerodynamic Loading, Feb. 1977.

11. Lamar, J.E. and Frink, N.T., "Experimental and Analytical Study of the Longitudinal Aerodynamic Characteristics of Analytically and Empirically Designed Strake-Wing Configurations at Subcritical Speeds," NASA TP-1803, June 1981.

12. Fox, C.H., Jr., "Subsonic Longitudinal and Lateral-Directional Static Aerodynamic Characteristics of a General Research Fighter Model Employing a Strake-Wing Concept," NASA TM-74071, 1978.

APPENDIX

FORTRAN PROGRAM LISTING

This program was written in Fortran IV language and is operational on CDC Cyber 175 computer system at NASA Langley Research Center. For other computer systems, the library subroutine for matrix inversion may have to be changed. It is located in subroutine INVN.

The following table is an index to the program listing. Subroutines are listed in the order of appearance.

Program or Subroutine	Main Purpose	Page
PNLEF	determine the location of a point relative to a leading-edge flap	101
GEMTRY	read and manipulate input data	102
GEOFUS	define fuselage geometry	118
PANEL	paneling of lifting surfaces	119
SPLINE	cubic spline subroutine	121
SHAPLE	define curved leading edges	122
SHAPTE	define curved trailing edges	122
DWASH	set up downwash matrix and obtain solutions	123
INVN	invert downwash matrix	133
WING	calculate downwash matrix of wings due to wings	134
UNFW	calculate normalwash coefficient on fuselage due to wings	138
VELFUS	manipulate velocity computations due to fuselage	142
FALONE	calculate the source distribution for the fuselage volume effect	146
SOLUTN	manipulate aerodynamic calculation	146
THRUST	calculate leading-edge thrust	152
GAMAX	calculate streamwise vortex density and side-edge suction	161
AUGVOR	calculate additional loading due to a discrete strake vortex	168

Program or Subroutine	Main Purpose	Page
SPNINT	perform spanwise integration to obtain the strength of a discrete strake vortex	169
LATERL	calculate the effect of lateral-directional motions	170
WBETA	calculate downwash due to additional wake vortices in sideslip	176
VLCTY	calculate downwash due to a discrete vortex	180
VERCOR	estimate the vertical position of the discrete strake vortex. Not used currently.	180
LOAD	compute and output total aerodynamic forces and moments	180
CPFUS	calculate pressure coefficient on fuselage	229
UTFW	calculate velocities on fuselage surface due to wings	232
FUSLFT	calculate fuselage forces and moments	235
CENTRD	calculate vortex-breakdown angles of attack	239
FRATN	determine the fraction of remaining vortex lift	247
REDBD	determine the decrease in alpha of vortex breakdown in the situation with augmented vortex lift	247

Program or Subroutine	Main Purpose	Page
BDPT	determine the location of vortex-breakdown point on the wing	248
BENDIN	calculate bending moment	248
BACKWH	calculate backwash due to image vortices in ground effect	251
DRAG	compute far-field induced drag	254

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      PROGRAM VORSTAB(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,                VS      2
     + TAPE1,TAPE2,TAPE3,TAPE4)                                             VS      3
C       OPTION  FORTRAN                                                     VS      4
C       FORTRAN NLSTIN                                                      VS      5
C OVLM                                                                      VS      6
C                                                                           VS      7
C    THIS PROGRAM IS BASED ON THE QUASI VORTEX LATTICE METHOD BY             VS      8
C      C. EDWARD LAN OF UNIVERSITY OF KANSAS                                VS      9
C                                                                           VS     10
C      REFERENCE   JOURNAL OF AIRCRAFT VOL. 11, NO. 9, SEPT. 1974, PP.518-VS     11
C      -527, AND AIAA PAPER-82-1385.                                        VS     12
C                                                                           VS     13
      DIMENSION TITLE(13)                                                   VS     14
      COMMON/LOOP/KP,NALP,KALP,TANC2,CLDS,AL,CLII,ALPII,ALPA(15)            VS     15
      COMMON/SL/ COSA,SINA,MZ,CTX,YBBK,7BK,GW,LATT                          VS     16
      COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),NAL(6)               VS     17
     1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6)     VS     18
     1,ICAMT(6)                                                             VS     19
      COMMON/GDSL/ DF(6,5),YCN(6,4),NLEF(6),NVRTX(6),SNALP(50),CNALP(50)VS     20
     1,ALPH(50),AUX(6,5),CRX(6,5),XTILT(6),SLETH(6),YCNTD(6)                VS     21
     1,NVL1(6),NVL2(6),XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF            VS     22
     1,BUX(6,5),SE(3,6,15),NUR(6),CVR(50),CPAUG(200)                        VS     23
     1,ALPBD(6,2),MX(6),ALBDBR(6,2),ALBDRL(6,2),MVRTX(6)                    VS     24
      COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)             VS     25
      COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)             VS     26
      COMMON /AJG/ ALP,J1,CP(200),GAMP(200),GAMB(200),GAMR(200)             VS     27
     1,GAMX(200),ZZCP(200),DZY(200),BMP(6,50),BML(6,50),CSU(50)             VS     28
      COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IAGVX,PT                    VS     29
     1,NAUG,IBD,PBK,PIS,IDIH,ALPINC,IRL,KT,PI,ALO,AL7                       VS     30
     2,NC1,NC2,IBLC                                                         VS     31
      COMMON /EXTPA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,     VS     32
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)                VS     33
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS     34
     15),DIST,P,BK,RL,CFF                                                   VS     35
      COMMON /VRDN/ ICOUNT,YBAR(6,2),YCMX(6,2),MSTP(6),YBR(6,2),YBRBR(6,VS     36
     12),YBRBL(6,2),YD2(6,2),YDR2(6,2),YDL2(6,2),ABD(6,2),ABDR(6,2)         VS     37
     1,ABDL(6,2),YREF(6),YCBR(6,2),YCBL(6,2)                                VS     38
      COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(200),LAT,CREF,BREF2             VS     39
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS     40
     1XLL(41)                                                               VS     41
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS     42
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS     43
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS     44
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                        VS     45
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),      VS     46
     1NFP(6),NW(6,2)                                                        VS     47
      COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,     VS     48
     120)                                                                   VS     49
      COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS     50
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     1,4),YLF(6,10,4),SLP1(6,10)                                                VS     51
      COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10,         VS     52
     120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)              VS     53
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),          VS     54
     1DDF(20)                                                                   VS     55
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),          VS     56
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,ROX,Y1           VS     57
      COMMON /INOUT/ INPT,JPT                                                   VS     58
      DATA YCON /51*0./                                                         VS     59
      DATA SWEEP /100*0./                                                       VS     60
      DATA XAS /6*0./                                                           VS     61
      DATA NKF /5*0/                                                            VS     62
      DATA BMR /300*0./                                                         VS     63
      DATA BML /300*0./                                                         VS     64
      DATA XL /30*0./                                                           VS     65
      DATA SE /270*0./                                                          VS     66
      DATA DUMT /270*0./                                                        VS     67
      DATA HALFB /6*0./                                                         VS     68
      DATA YBREAK /42*0./                                                       VS     69
      DATA DSIN /30*0./                                                         VS     70
      DATA DCOS /30*0./                                                         VS     71
      DATA ALPH /50*0./                                                         VS     72
      DATA CH /100*0./                                                          VS     73
    8 FORMAT (1X,40H****************************************)                  VS     74
  413 FORMAT (1H1)                                                            VS     75
  420 FORMAT (13A6)                                                           VS     76
  421 FORMAT (1X,13A6)                                                        VS     77
   15 FORMAT (2(6X,I4))                                                       VS     78
   16 FORMAT (2X,17HANGLE OF ATTACK =,F8.3,2X,4HDEG.)                         VS     79
C                                                                             VS     80
C  *** CASE TITLE ***                                                        VS     81
C                                                                             VS     82
      INPT=5                                                                  VS     83
      JPT=6                                                                   VS     84
      RAD = 57.29577958                                                       VS     85
   20 READ (INPT,420) (TITLE(I),I=1,13)                                       VS     86
      IF (EOF(INPT).NE.0.)  GO TO 30                                          VS     87
      WRITE(JPT,413)                                                          VS     88
      WRITE(JPT,8)                                                            VS     89
      WRITE(JPT,421) (TITLE(I),I=1,13)                                        VS     90
      WRITE(JPT,8)                                                            VS     91
C       CALL LLINK(6HLINK11)                                                  VS     92
      CALL GEMTRY                                                             VS     93
      BREAK(6,10)=0.                                                          VS     94
C       ALPHA LOOP                                                            VS     95
      DO 10 KW=1,NALP                                                         VS     96
      KP=KW                                                                   VS     97
      ALFF = ALPA(KW) * RAD                                                   VS     98
      WRITE(JPT,8)                                                            VS     99
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```
      WRITE(JPT,16) ALFF                                                VS   100
      WRITE(JPT,8)                                                      VS   101
C       CALL LLINK(6HLINK22)                                            VS   102
      CALL DWASH                                                        VS   103
C       CALL LLINK(6HLINK33)                                            VS   104
      CALL SOLUTN                                                       VS   105
C       CALL LLINK(6HLINK44)                                            VS   106
      CALL LOAD                                                         VS   107
C     WRITE(JPT,15) KP,NALP                                             VS   108
      IF(ABS(AL).LT.0.001) GO TO 12                                     VS   109
   10 CONTINUE                                                          VS   110
   12 CONTINUE                                                          VS   111
      GO TO 20                                                          VS   112
   30 STOP                                                              VS   113
      END                                                               VS   114
C       FORTRAN NLSTIN                                                  VS   115
      FUNCTION FUR(X)                                                   VS   116
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),  VS   117
     1DDF(20)                                                           VS   118
      IF (IFR .NE. 0) GO TO 10                                          VS   119
C                                                                       VS   120
C  * DEFINE THE FUSELAGE RADIUS AS A FUNCTION OF X *                    VS   121
C                                                                       VS   122
C     F1068,ASSUMED TO BE SIMILAR TO THAT OF NASA MEMO-                 VS   123
C     10-5-58A FROM NOSE TO C.G.                                        VS   124
      IF(X.GT.3.4583) GO TO 2                                           VS   125
      A1=2.*(X+0.3742)/7.665                                            VS   126
      A2=(1.-A1)**2                                                     VS   127
      A3=(1.-A2)**0.75                                                  VS   128
      FUR=0.2892*A3                                                     VS   129
      GO TO 5                                                           VS   130
    2 FUR=0.2892                                                        VS   131
      GO TO 5                                                           VS   132
   10 CONTINUE                                                          VS   133
      K=1                                                               VS   134
   12 IF (X.GE.XFF(K) .AND. X.LT.XFF(K+1)) GO TO 15                     VS   135
      K=K+1                                                             VS   136
      IF (K .GE. IFN) GO TO 20                                          VS   137
      GO TO 12                                                          VS   138
   15 SM=X-XFF(K)                                                       VS   139
      FUR=AAF(K)*SM**3+BBF(K)*SM**2+CCF(K)*SM+DDF(K)                    VS   140
      GO TO 5                                                           VS   141
   20 IF (X .LT. XFF(1)) GO TO 25                                       VS   142
      K=IFN-1                                                           VS   143
      GO TO 15                                                          VS   144
   25 K=1                                                               VS   145
      GO TO 15                                                          VS   146
    5 RETURN                                                            VS   147
      END                                                               VS   148
```

```
C       FORTRAN NLSTIN                                                    VS   149
        FUNCTION SLOP (X)                                                 VS   150
        COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),  VS   151
       1DDF(20)                                                           VS   152
        IF (IFR .NE. 0) GO TO 10                                          VS   153
C                                                                         VS   154
C   * DEFINE THE DERIVATIVE OF FUSELAGE RADIUS WITH DIMENSIONAL X         VS   155
C     MULTIPLIED BY RADIUS, DR, =R(DR/DX) . *                           VS   156
C                                                                         VS   157
C       F106B                                                             VS   158
        IF(X.GT.3.4583) GO TO 2                                           VS   159
        A1=2.*(X+0.3742)/7.665                                            VS   160
        A2=1.-A1                                                          VS   161
        A3=SQRT(1.-A2*A2)                                                 VS   162
        SLOP=0.032734*A2*A3                                               VS   163
        GO TO 5                                                           VS   164
     2  SLOP=0.                                                           VS   165
        GO TO 5                                                           VS   166
    10  CONTINUE                                                          VS   167
        K=1                                                               VS   168
    12  IF (X.GE.XFF(K) .AND. X .LT. XFF(K+1)) GO TO 15                   VS   169
        K=K+1                                                             VS   170
        IF (K .GE. IFN) GO TO 20                                          VS   171
        GO TO 12                                                          VS   172
    15  SM=X-XFF(K)                                                       VS   173
        SLOP=3.*AAF(K)*SM**2+2.*BBF(K)*SM+CCF(K)                          VS   174
        SLOP=SLOP*FUR(X)                                                  VS   175
        GO TO 5                                                           VS   176
    20  IF (X .LT. XFF(1)) GO TO 25                                       VS   177
        K=IFN-1                                                           VS   178
        GO TO 15                                                          VS   179
    25  K=1                                                               VS   180
        GO TO 15                                                          VS   181
     5  RETURN                                                            VS   182
        END                                                               VS   183
C       FORTRAN NLSTIN                                                    VS   184
        SUBROUTINE FUSVOL (B,X,Y,Z,WN,WK,GBO,L,MZ,CSD,SSD)                VS   185
C       TO CALCULATE FUSELAGE VOLUME EFFECT BASED ON SOURCE DISTRIBUTION  VS   186
        COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS   187
       1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,X1   VS   188
        R=SQRT(Y*Y+Z*Z)                                                   VS   189
        PI=3.14159265                                                     VS   190
        IF (Z) 10,20,30                                                   VS   191
    10  THETA=PI-ATAN(Y/ABS(Z))                                           VS   192
        GO TO 40                                                          VS   193
    20  THETA=PI/2.                                                       VS   194
        GO TO 40                                                          VS   195
    30  THETA=ATAN(Y/ABS(Z))                                              VS   196
    40  A1=X-XTEF                                                         VS   197
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```
      A2=SQRT(A1*A1+B*R*R)                                              VS   198
      RFL=A1/A2/R                                                       VS   199
      XEF=X-XLEF                                                        VS   200
      B2=SQRT(XEF*XEF+B*R*R)                                            VS   201
      RFO=XEF/R/B2                                                      VS   202
      FT=-(A1+A2)/R+(XEF+B2)/P                                          VS   203
      FR=(1.+A1/A2)/R*A1/R-(1.+XEF/B2)/P*XEF/R                          VS   204
      CS=COS(THETA)                                                     VS   205
      SN=SIN(THETA)                                                     VS   206
      FCOS=CS*CSD-SN*SSD                                                VS   207
      FSIN=SN*CSD+CS*SSD                                                VS   208
      WN=0.                                                             VS   209
      IF (MZ .NE. 0) GO TO 70                                           VS   210
      IK=0                                                              VS   211
      N1=NKF(1)                                                         VS   212
      N2=1                                                              VS   213
      FNF=NKF(1)                                                        VS   214
      S=XAS(2)-XAS(1)                                                   VS   215
      WN=0.                                                             VS   216
      DO 50 J=1,NF                                                      VS   217
      M=J-IK                                                            VS   218
      XS=X-XF(J)                                                        VS   219
      XSR=SQRT(XS*XS+B*R*R)                                             VS   220
      RFX=XS/XSR/R                                                      VS   221
      WN=WN+(RFL-RFX)*WARD(J)*SNP(N2,M)*S/FNF                           VS   222
      IF (J .NE. N1 .OR. J .EQ. NF) GO TO 50                            VS   223
      N2=N2+1                                                           VS   224
      IK=N1                                                             VS   225
      N1=N1+NKF(N2)                                                     VS   226
      S=XAS(N2+1)-XAS(N2)                                               VS   227
      FNF=NKF(N2)                                                       VS   228
   50 CONTINUE                                                          VS   229
      WN=WN*PI/2.                                                       VS   230
      WN=-(WN+(RFL-RFO)*FO)/(4.*PI)                                     VS   231
      WN=WN*FCOS                                                        VS   232
      FP=F10                                                            VS   233
      S1=SN                                                             VS   234
      S2=CS                                                             VS   235
      GO TO 76                                                          VS   236
   70 FP=G80                                                            VS   237
      IF (WK .GT. 0.9) GO TO 75                                         VS   238
      S1=-CS                                                            VS   239
      S2=SN                                                             VS   240
      GO TO 76                                                          VS   241
   75 S1=SN                                                             VS   242
      S2=CS                                                             VS   243
   76 CONTINUE                                                          VS   244
      WN=WN-FSIN*S1*FT*FP/R/(4.*PI)-FCOS*S2*FR*FP/(4.*PI)               VS   245
   60 CONTINUE                                                          VS   246
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C-2

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      WK=(-SN*FSIN*FT/R-CS*FCOS*FR)/(4.*PI)                                VS   247
      RETURN                                                               VS   248
      END                                                                  VS   249
C      FORTRAN NLSTIN                                                      VS   250
      SUBROUTINE UNWF (B,X,Y,Z,AW,BW,CSD,SSD)                              VS   251
C     TO CALCULATE THE EFFECT OF FUSELAGE ON WINGS                         VS   252
      DIMENSION AW(1),BW(1)                                                VS   253
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),     VS   254
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,X1      VS   255
      PI=3.14159265                                                        VS   256
      IBW=BW(1)                                                            VS   257
      R=SQRT(Y*Y+Z*Z)                                                      VS   258
      IF (Z) 10,20,30                                                      VS   259
   10 THETA=PI-ATAN(Y/ABS(Z))                                              VS   260
      GO TO 40                                                             VS   261
   20 THETA=PI/2.                                                          VS   262
      GO TO 40                                                             VS   263
   30 THETA=ATAN(Y/ABS(Z))                                                 VS   264
   40 A1=X-XTEF                                                            VS   265
      A2=SQRT(A1*A1+B*R*R)                                                 VS   266
      C1=COS(THETA)                                                        VS   267
      S1=SIN(THETA)                                                        VS   268
      FCOS=C1*CSD-S1*SSD                                                   VS   269
      FSIN=S1*CSD+C1*SSD                                                   VS   270
      DO 60 N=1,NT                                                         VS   271
      FNF=NKF(1)                                                           VS   272
      IK=0                                                                 VS   273
      N1=NKF(1)                                                            VS   274
      N2=1                                                                 VS   275
      S=XAS(2)-XAS(1)                                                      VS   276
      FN=N                                                                 VS   277
      FLT=0.                                                               VS   278
      FLR=0.                                                               VS   279
      IF (N .GE. 2) GO TO 70                                               VS   280
      A3=((A1+A2)/R)**N                                                    VS   281
      FLT=-A3/FN                                                           VS   282
      FLR=A1/R*A3/A2                                                       VS   283
   70 CONTINUE                                                             VS   284
      DO 50 JJ=1,NF                                                        VS   285
      M=JJ-IK                                                              VS   286
      K=JJ+(N-1)*NF                                                        VS   287
      XS=X-XF(JJ)                                                          VS   288
      XSR=SQRT(XS*XS+B*R*R)                                                VS   289
      XR=((XS+XSR)/R)**N                                                   VS   290
      FTX=-XR/FN                                                           VS   291
      FRX=XS/R*XR/XSR                                                      VS   292
      P1=S*(FRX-FLR)*SNP(N2,M)/(8.*FNF)                                    VS   293
      P2=S*(FTX-FLT)*SNP(N2,M)/(8.*FNF)                                    VS   294
      Q1=COS(FN*THETA)                                                     VS   295
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      Q2=SIN(FN*THETA)                                                    VS   296
      UR=Q1*P1                                                            VS   297
      UT=-FN*Q2*P2                                                        VS   298
      VR=Q2*P1                                                            VS   299
      VT=FN*Q1*P2                                                         VS   300
      VT=VT/R                                                             VS   301
      UT=UT/R                                                             VS   302
      IF (JJ .NE. N1) GO TO 55                                            VS   303
      N2=N2+1                                                             VS   304
      IK=N1                                                               VS   305
      N1=N1+NKF(N2)                                                       VS   306
      S=XAS(N2+1)-XAS(N2)                                                 VS   307
      FNF=NKF(N2)                                                         VS   308
   55 IF (IBW .EQ. 1) GO TO 80                                            VS   309
      BW(K)=VR*FCOS-VT*FSIN                                               VS   310
      AW(K)=UR*FCOS-UT*FSIN                                               VS   311
      GO TO 50                                                            VS   312
   80 AW(K)=VR*FSIN+VT*FCOS                                               VS   313
   50 CONTINUE                                                            VS   314
   60 CONTINUE                                                            VS   315
      RETURN                                                              VS   316
      END                                                                 VS   317
C      FORTRAN NLSTIN                                                     VS   318
      SUBROUTINE FUSELA(NF,AW,N,I,S,XTEF,XF,XCF,RF,BB,SNP,NKF)            VS   319
C     TO SET UP THE DOWNWASH MATRIX FOR FUSELAGE DUE TO FUSELAGE          VS   320
      DIMENSION AW(1),XF(1),RF(1),XCF(1),SNP(5,20),S(1),NKF(1)            VS   321
      PI=3.14159265                                                       VS   322
      IK=0                                                                VS   323
      N1=NKF(1)                                                           VS   324
      N2=1                                                                VS   325
      HL=(S(2)-S(1))/2.                                                   VS   326
      FNT=NKF(1)                                                          VS   327
      A1=XCF(I)-XTEF                                                      VS   328
      A2=SQRT(A1*A1+BB*RF(I)*RF(I))                                       VS   329
      DO 5 JJ=1,NF                                                        VS   330
      M=JJ-IK                                                             VS   331
      XS=XCF(I)-XF(JJ)                                                    VS   332
      XSR=SQRT(XS*XS+BB*RF(I)*RF(I))                                      VS   333
      IF (N .EQ. 0)GO TO 10                                               VS   334
      RFL=1.                                                              VS   335
      IF (N .GE. 2)GO TO 15                                               VS   336
      IF (I .EQ. NF) RFL=0.                                               VS   337
      IF (I .NE. NF) RFL=(A1+A2)**N*A1/A2                                 VS   338
   15 CONTINUE                                                            VS   339
      RFR=(XS+XSR)**N*XS/XSR                                              VS   340
      GO TO 6                                                             VS   341
   10 IF (I .NE. NF) RFL=A1/A2                                            VS   342
      IF (I .EQ. NF) RFL=0.                                               VS   343
      RFR=XS/XSR                                                          VS   344
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C-2

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    6 AW(JJ)=-HL*(RFL-RFR)*SNP(N2,M)/(4.*FNT)                          VS   345
      IF(JJ.NE.N1.OR.JJ.EQ.NF) GO TO 5                                 VS   346
      N2=N2+1                                                          VS   347
      IK=N1                                                            VS   348
      N1=N1+NKF(N2)                                                    VS   349
      HL=(S(N2+1)-S(N2))/2.                                            VS   350
      FNT=NKF(N2)                                                      VS   351
    5 CONTINUE                                                         VS   352
      RETURN                                                           VS   353
      END                                                              VS   354
C      FORTRAN NLSTIN                                                  VS   355
      SUBROUTINE ZCDX(X,Y,ZCX,DZDY)                                    VS   356
C     DEFINE THE CAMBER SLOPE, DZDX, AT ANY X,Y LOCATION IN CLOSED FORM,VS   357
C     WHERE X AND Y ARE DIMENSIONAL COORDINATES REFERRED TO C.G.       VS   358
C                                                                      VS   359
C     CONICAL CAMBER FOR F106B                                         VS   360
      YB=0.46188*(X-1.7516)                                            VS   361
      YE=0.57735*(X-1.7516)                                            VS   362
      ZCX=0.                                                           VS   363
      DZDY=0.                                                          VS   364
      IK=0                                                             VS   365
      IF(Y.GT.YE) IK=1                                                 VS   366
      IF(Y.LT.YB) Y=0.                                                 VS   367
      IF(Y.LT.YB) RETURN                                               VS   368
      IF(Y.GT.YE) Y=YE                                                 VS   369
      R=0.420473*(X-1.7516)                                            VS   370
      ZC=-R+SQRT(R*R-(Y-YB)**2)                                        VS   371
      ZCX=0.                                                           VS   372
      IF(IK.EQ.1) GO TO 5                                              VS   373
      ZCX=(0.46188*(Y-YB)-0.420473*ZC)/(ZC+R)                          VS   374
      DZDY=-(Y-YB)/(ZC+R)                                              VS   375
    5 CONTINUE                                                         VS   376
      Y=ZC                                                             VS   377
C     Y IS RETURNED AS THE Z COORDINATE.                               VS   378
      RETURN                                                           VS   379
      END                                                              VS   380
C      FORTRAN NLSTIN                                                  VS   381
      SUBROUTINE TWIST (Y,ATW,I)                                       VS   382
C     TO CALCULATE THE LOCAL TWIST ANGLE                               VS   383
      COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,VS   384
     120)                                                              VS   385
      PI=3.14159265                                                    VS   386
      K=1                                                              VS   387
    1 IF (Y.GE.YTS(I,K).AND.Y.LT.YTS(I,K+1)) GO TO 2                   VS   388
      K=K+1                                                            VS   389
      IF (K.GE.NYM(I)) GO TO 3                                         VS   390
      GO TO 1                                                          VS   391
    2 SM=Y-YTS(I,K)                                                    VS   392
      ATW=AY(I,K)*SM**3+BY(I,K)*SM*SM+CCY(I,K)*SM+DY(I,K)              VS   393
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      ATW=ATW*PI/180.                                                    VS   394
      GO TO 5                                                            VS   395
    3 IF (Y.LT.YTS(I,1)) GO TO 4                                         VS   396
      K=NYM(I)-1                                                         VS   397
      GO TO 2                                                            VS   398
    4 K=1                                                                VS   399
      GO TO 2                                                            VS   400
    5 RETURN                                                             VS   401
      END                                                                VS   402
C      FORTRAN NLSTIN                                                    VS   403
      SUBROUTINE ZCR(X,Y,DZDX,ICAM,X1,K,KP,CHORD,DZDY,IST,SWP)           VS   404
C     TO DEFINE CAMBER SHAPES                                            VS   405
      COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS   406
     1,4),YLF(6,10,4),SLP1(6,10)                                         VS   407
      DIMENSION IST(1),ICAM(1)                                           VS   408
      XE=X1                                                              VS   409
      KK=DZDX                                                            VS   410
      RR=DZDY                                                            VS   411
      DZDX=0.                                                            VS   412
      DZDY=0.                                                            VS   413
      IF (ICAM(K).EQ.1) GO TO 2                                          VS   414
      IF (ICAM(K).NE.3) GO TO 15                                         VS   415
      X1=0.                                                              VS   416
      I=1                                                                VS   417
    3 IF (Y.GE.YLEF(K,I,1).AND.Y.LE.YLEF(K,I,2)) GO TO 5                 VS   418
      I=I+1                                                              VS   419
      IF (I.GT.IST(K)) GO TO 15                                          VS   420
      IF(I.EQ.11) GO TO 15                                               VS   421
      GO TO 3                                                            VS   422
    5 YB=YLF(K,I,1)+SLP1(K,I)*(X-XLF(K,I,1))                             VS   423
      KCON=0                                                             VS   424
      IF(KK.NE.100) GO TO 11                                             VS   425
      XB=XLF(K,I,1)                                                      VS   426
      IF (SLP1(K,I).GT.1.E-18) XB=XLF(K,I,1)+(Y-YLF(K,I,1))/SLP1(K,I)    VS   427
      DX=RR/(XB-XE)                                                      VS   428
      IF(ABS(1.-DX).LE.0.1) KCON=1                                       VS   429
      IF(KCON.EQ.1) GO TO 10                                             VS   430
   11 CONTINUE                                                           VS   431
      IF(Y.LT.YB) RETURN                                                 VS   432
   10 CONTINUE                                                           VS   433
      TEST1=PNLEF (X,Y,XLF,YLF,I,1,2,K)                                  VS   434
      IF(TEST1.LT.0.) RETURN                                             VS   435
      TEST2=PNLEF (X,Y,XLF,YLF,I,4,3,K)                                  VS   436
      IF(TEST2.GT.0.) RETURN                                             VS   437
      DZDX=-XNF(K,I)/ZNF(K,I)                                            VS   438
      DZDY=-YNF(K,I)/ZNF(K,I)                                            VS   439
      D=-XNF(K,I)*XLF(K,I,1)-YNF(K,I)*YLF(K,I,1)                         VS   440
      X1=-(D+XNF(K,I)*X+YNF(K,I)*Y)/ZNF(K,I)                             VS   441
      IF(KCON.EQ.0) GO TO 15                                             VS   442
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      DZDX=0.5*DZDX                                                          VS   443
      DZDY=0.5*DZDY                                                          VS   444
      X1=0.                                                                  VS   445
      GO TO 15                                                               VS   446
    2 CALL ZCAM(X,Y,ZR,X1,K,KP,CHORD,IST,DZDY,SWP)                           VS   447
      DZDX=ZR                                                                VS   448
   15 RETURN                                                                 VS   449
      END                                                                    VS   450
C      FORTRAN NLSTIN                                                        VS   451
      SUBROUTINE ZCAM(X,Y,ZR,X1,KQ,KP,CHORD,IST,DZDY,SWP)                    VS   452
C     TO CALCULATE CAMBER SLOPES                                             VS   453
      COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10,      VS   454
     120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)           VS   455
      DIMENSION ZZ(2),ZQ(2),C(15),IST(1),ZY(2)                               VS   456
      K=KQ                                                                   VS   457
      L=KQ                                                                   VS   458
      I=KP                                                                   VS   459
      ZR=0.                                                                  VS   460
    3 IF (Y.GE.YT(K,I).AND.Y.LT.YT(K,I+1)) GO TO 2                           VS   461
      I=I+1                                                                  VS   462
      IF (I.EQ.IST(K)) GO TO 6                                               VS   463
      GO TO 3                                                                VS   464
    6 IF (Y.LT.YT(K,1)) I=1                                                  VS   465
      IF (Y.GT.YT(K,IST(K))) I=IST(K)-1                                      VS   466
    2 IK=1                                                                   VS   467
      XF=0.                                                                  VS   468
      ICV=CURV(K,I)                                                          VS   469
      IF(ICV.NE.2) GO TO 4                                                   VS   470
      XF1=XT(K,I,2)*CHND(K,I)                                                VS   471
      IF (ABS(DDM(K,I,1)).LE.0.0001) XF1=XT(K,I,1)*CHND(K,I)                 VS   472
      XF2=XT(K,I+1,2)*CHND(K,I+1)                                            VS   473
      YF=(Y-YT(K,I))/(YT(K,I+1)-YT(K,I))                                     VS   474
      XF=(XF1+(XF2-XF1)*YF)/CHORD                                            VS   475
      IF(X1.GT.XF) GO TO 4                                                   VS   476
      FAC=CHND(K,I+1)                                                        VS   477
      IF(FAC.LE.0.0001) FAC=1.                                               VS   478
      DELTA=DDM(K,I,1)*CHND(K,I)+(DDM(K,I+1,1)*FAC-DDM(K,I,1)*CHND(K,I)      VS   479
     1)*YF                                                                   VS   480
      DELTA=DELTA/CHORD                                                      VS   481
      IF (IM(K,I).GT.2) ZQ(1)=DDM(K,I,2)*CHND(K,I)                           VS   482
      IF (IM(K,I).LE.2) ZQ(1)=(CCM(K,I,1)+DDM(K,I,1))*CHND(K,I)              VS   483
      IF (IM(K,I+1).GT.2) ZQ(2)=DDM(K,I+1,2)*FAC                             VS   484
      IF (IM(K,I+1).LE.2) ZQ(2)=(CCM(K,I+1,1)+DDM(K,I+1,1))*FAC              VS   485
      DK=(ZQ(1)+(ZQ(2)-ZQ(1))*YF)/CHORD                                      VS   486
      DELTA=DELTA-DK                                                         VS   487
      GO TO 16                                                               VS   488
    4 K=1                                                                    VS   489
    1 IF (X.GE.XT(L,I,K).AND.X.LT.XT(L,I,K+1)) GO TO 5                       VS   490
      K=K+1                                                                  VS   491
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      IF (K.GE.IM(L,I)) GO TO 10                                                    VS   492
      GO TO 1                                                                       VS   493
    5 SM=X-XT(L,I,K)                                                                VS   494
      ZZ(IK)=3.*AAM(L,I,K)*SM*SM+2.*BBM(L,I,K)*SM+CCM(L,I,K)                        VS   495
      ZY(IK)=AAM(L,I,K)*SM**3+BBM(L,I,K)*SM*SM+CCM(L,I,K)*SM+DDM(L,I,K)             VS   496
      ZY(IK)=ZY(IK)*CHND(L,I)                                                       VS   497
      GO TO 15                                                                      VS   498
   10 IF (X.LT.XT(L,I,1)) GO TO 20                                                  VS   499
      K=IM(L,I)-1                                                                   VS   500
      GO TO 5                                                                       VS   501
   20 K=1                                                                           VS   502
      GO TO 5                                                                       VS   503
   15 IF(IK.EQ.2) GO TO 25                                                          VS   504
      IF(I.GE.IST(L)) GO TO 60                                                      VS   505
      I=I+1                                                                         VS   506
      IK=IK+1                                                                       VS   507
      GO TO 4                                                                       VS   508
   25 YF=(Y-YT(L,I-1))/(YT(L,I)-YT(L,I-1))                                          VS   509
      GO TO 65                                                                      VS   510
   60 YF=0.                                                                         VS   511
      ZZ(2)=0.                                                                      VS   512
   65 CONTINUE                                                                      VS   513
      ZR=ZZ(1)+(ZZ(2)-ZZ(1))*YF                                                     VS   514
      DY=YT(L,I)-YT(L,I-1)                                                          VS   515
      ZZY=(ZY(2)-ZY(1))/DY                                                          VS   516
      DZDY=-SWP*ZR+ZZY                                                              VS   517
      X1=ZY(1)+(ZY(2)-ZY(1))*YF                                                     VS   518
      GO TO 30                                                                      VS   519
   16 IF(X.LT.XF) GO TO 45                                                          VS   520
      PI=3.14159265                                                                 VS   521
      C(1)=-DELTA                                                                   VS   522
      JR=15                                                                         VS   523
      DO 40 J=2,JR                                                                  VS   524
      XK=(J-1)*PI*XF                                                                VS   525
   40 C(J)=-2.*DELTA*SIN(XK)/XK                                                     VS   526
      ZR=0.                                                                         VS   527
      DO 50 J=1,JR                                                                  VS   528
      XK=(J-1)*PI*X                                                                 VS   529
   50 ZR=ZR+C(J)*COS(XK)                                                            VS   530
      GO TO 30                                                                      VS   531
   45 ZR=-DELTA/XF                                                                  VS   532
   30 CONTINUE                                                                      VS   533
      RETURN                                                                        VS   534
      END                                                                           VS   535
C      FORTRAN NLSTIN                                                             VS   536
      SUBROUTINE VMSEON (NC1,K,AA,A,CA)                                          VS   537
C     TO SOLVE EQUATIONS WITHOUT MATRIX INVERSION FOR A SINGLE ALPHA              VS   538
      DIMENSION AA(1),CA(1),A(1)                                                 VS   539
      NC=K*NC1                                                                   VS   540
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      SUM1=0.                                                                VS   541
      K1=K-1                                                                 VS   542
      JJ=1                                                                   VS   543
      DO 3 J=1,K1                                                            VS   544
      SUM1=SUM1+AA(J)*A(JJ)                                                  VS   545
    3 JJ=JJ+NC1+1                                                            VS   546
      SUM1=SUM1+AA(K)                                                        VS   547
      DO 5 I=1,NC1                                                           VS   548
      SUM2=0.                                                                VS   549
      JJ=I+1                                                                 VS   550
      DO 4 J=1,K1                                                            VS   551
      SUM2=SUM2+AA(J)*A(JJ)                                                  VS   552
    4 JJ=JJ+NC1+1                                                            VS   553
      KK=K+I                                                                 VS   554
      SUM2=SUM2+AA(KK)                                                       VS   555
    5 CA(I)=-SUM2/SUM1                                                       VS   556
      M=1                                                                    VS   557
      L=0                                                                    VS   558
      KNC=(K-1)*NC1                                                          VS   559
      DO 8 I=1,NC                                                            VS   560
      IF (I.GT.KNC) GO TO 7                                                  VS   561
      MM=(M-1)*NC1+1                                                         VS   562
      IF (I.EQ.MM) GO TO 9                                                   VS   563
    6 KK=KK+1                                                                VS   564
      IL=I+L                                                                 VS   565
      A(I)=CA(KK)*BASE+A(IL)                                                 VS   566
      GO TO 8                                                                VS   567
    7 II=I-KNC                                                               VS   568
      A(I)=CA(II)                                                            VS   569
    8 CONTINUE                                                               VS   570
      GO TO 10                                                               VS   571
    9 II=MM+M-1                                                              VS   572
      BASE=A(II)                                                             VS   573
      KK=0                                                                   VS   574
      L=L+1                                                                  VS   575
      M=M+1                                                                  VS   576
      GO TO 6                                                                VS   577
   10 CONTINUE                                                               VS   578
      RETURN                                                                 VS   579
      END                                                                    VS   580
C      FORTRAN NLSTIN                                                        VS   581
      FUNCTION PNLEF(X,Y,XLF,YLF,I,J,K,L)                                    VS   582
      DIMENSION XLF(6,10,4),YLF(6,10,4)                                      VS   583
      PNLEF=(X-XLF(L,I,J))*(YLF(L,I,K)-YLF(L,I,J))-(XLF(L,I,K)-XLF(L,I,      VS   584
     1J))*(Y-YLF(L,I,J))
      RETURN                                                                 VS   585
      END                                                                    VS   586
C      LINK    LINK11                                                        VS   587
C      FORTRAN NLSTIN                                                        VS   588
                                                                             VS   589
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      SUBROUTINE GEMTRY                                                 VS    590
C     TO INPUT AND MANIPULATE INPUT DATA                                VS    591
      DIMENSION XXL(2),YL(2),XXT(2),CPCWL(16),CPSWL(31),AW(50),CA(50)   VS    592
      COMMON /VBDN/ ICOUNT,YBAR(6,2),YCMX(6,2),MSTP(6),YBR(6,2),YBRBR(6,VS    593
     12),YBRBL(6,2),YD2(6,2),YDR2(6,2),YDL2(6,2),ABD(6,2),ABDR(6,2)     VS    594
     1,ABDL(6,2),YREF(6),YCBR(6,2),YCBL(6,2)                            VS    595
      COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(200),LAT,CREF,BREF2         VS    596
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS    597
     1XLL(41)                                                           VS    598
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS    599
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS    600
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS    601
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                    VS    602
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS    603
     1NFP(6),NW(6,2)                                                    VS    604
      COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10, VS    605
     120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)      VS    606
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT, VS    607
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)            VS    608
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS    609
     15),DIST,P,BK,RL,CFF                                               VS    610
      COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS    611
     1,4),YLF(6,10,4),SLP1(6,10)                                        VS    612
      COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6, VS    613
     120)                                                               VS    614
      COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)         VS    615
      COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)         VS    616
      COMMON /AJG/ ALP,J1,CP(200),GAMP(200),GAMR(200),GAMR(200)         VS    617
     1,GAMX(200),ZZCP(200),DZY(200),BMP(6,50),BML(6,50),CSU(50)         VS    618
      COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IAGVX,PT                VS    619
     1,NAUG,IBD,PBK,PIS,IDIH,ALPINC,IRL,KT,PI,ALO,ALZ                   VS    620
     2,NC1,NC2,IBLC                                                     VS    621
      COMMON/LOOP/KW,NALP,KALP,TANC2,CLDS,AL,CLII,ALPII,ALPA(15)        VS    622
      COMMON/GD/ TINP(6),BREAK(6,10),TELP(6,5),RINC(6),NAL(6)           VS    623
     1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6) VS    624
     1,ICAMT(6)                                                         VS    625
      COMMON/GDSL/ DF(6,5),YCN(6,4),NLEF(6),NVRTX(6),SNALP(50),CNALP(50)VS    626
     1,ALPH(50),AUX(6,5),CRX(6,5),XTILT(6),SLETH(6),YCNTD(6)            VS    627
     1,NVL1(6),NVL2(6),XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF        VS    628
     1,BUX(6,5),SE(3,6,15),NUR(6),CVR(50),CPAUG(200)                    VS    629
     1,ALPBD(6,2),MX(6),ALBDBR(6,2),ALBDBL(6,2),MVRTX(6)                VS    630
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),  VS    631
     1DDF(20)                                                           VS    632
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS    633
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,RDX,X1   VS    634
      COMMON /INOUT/ INPT,JPT                                           VS    635
    2 FORMAT (8F10.6)                                                   VS    636
    3 FORMAT (8(6X,I4))                                                 VS    637
    4 FORMAT (10X,8HHALF SW=,E12.5,10X,5HCREF=,E12.5)                   VS    638
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    6 FORMAT (15H CASE NUMBER = ,I2)                                        VS   639
    7 FORMAT (6F10.5)                                                       VS   640
    8 FORMAT (1X,40H****************************************)               VS   641
  400 FORMAT(11HOINPUT DATA)                                                VS   642
  403 FORMAT(37HOVORTEX ELEMENT ENDPOINT COORDINATES=)                      VS   643
  404 FORMAT(27HOCONTROL POINT COORDINATES=)                                VS   644
  411 FORMAT(/4X,3HXCP,7X,3HYCP,7X,3HZCP,7X,3HXCP,7X,3HYCP,7X,3HZCP)        VS   645
  412 FORMAT(/4X,2HX1,8X,2HX2,8X,2HY1,8X,2HY2,8X,2H71,6X,2HZ2)              VS   646
      PI=3.14159265                                                         VS   647
      PIS=PI*2.                                                             VS   648
      PIA=PI/2.                                                             VS   649
      CNET=PI/180.                                                          VS   650
C     FILE (01),BUX(6,5)IS FOR NORMALWASH INFLUENCE COEFFICIENT MATRIX.     VS   651
C       SUBROUTINE WING.                                                    VS   652
C     FILE (02) IS FOR INVERTED INFLUENCE COEFFICIENT MATRIX. SEE           VS   653
C       SUBROUTINE INVN.                                                    VS   654
C     FILE (03) IS FOR WAKE-INDUCED NORMALWASH IN LATERAL-DIRECTIONAL       VS   655
C       MOTION. SEE SUBROUTINE WBETA.                                       VS   656
C                                                                           VS   657
C  *** USER'S CASE NUMBER ***                                               VS   658
C     NGRD=1 IF THE WING IS IN GROUND EFFECT, =0 OTHERWISE                  VS   659
C **  NASYM=0 IF THE PLANFORM IS SYMMETRICAL ABOUT X-AXIS                   VS   660
C           =1 OTHERWISE. IN THIS CASE, THE WHOLE PLANFORM MUST BE          VS   661
C              DEFINED, STARTING FROM THE LEFT TIP.                         VS   662
C     NSUR = NUMBER OF LIFTING SURFACES, SUCH AS WING, CANARD, TAILS,       VS   663
C      ETC. LIMITED TO 5.                                                   VS   664
C                                                                           VS   665
      READ (INPT,3) NCASE,NGRD,NASYM,NSUR                                   VS   666
      WRITE(JPT,3) NCASE,NGRD,NASYM,NSUR                                    VS   667
      WRITE (JPT,8)                                                         VS   668
      WRITE (JPT,6) NCASE                                                   VS   669
      WRITE (JPT,8)                                                         VS   670
      NCS=0                                                                 VS   671
      IPANEL=1                                                              VS   672
      YCON(50)=NASYM                                                        VS   673
      DIST=0.                                                               VS   674
      HALFSH=0.                                                             VS   675
      WRITE (JPT,400)                                                       VS   676
C                                                                           VS   677
C  ** LAT=-1 IF THE ROLLING MOMENT COEFFICIENT AT A GIVEN AILERON ANGLE     VS   678
C             IS DESIRED                                                    VS   679
C        =0 FOR NO LATERAL MODE OF MOTION                                   VS   680
C        =1 IF LATERAL-DIRECTIONAL DERIVATIVES ARE TO BE COMPUTED           VS   681
C     FOR ASYMMETRICAL CONFIGURATIONS, (I.E. NASYM=1), SET LAT=0            VS   682
C     IBLC=1 IF A BOUNDARY LAYER CORRECTION IS TO BE ALPPLIED TO ROLL       VS   683
C          DERIVATIVES.   =0, OTHERWISE                                     VS   684
C     KT=1 IF THE LEADING EDGE IS A ROUNDED ON AND ITS EFFECT ON L.E.       VS   685
C       THRUST WILL BE INCLUDED. =0, OTHERWISE                              VS   686
C     IBD = 1 IF THE VORTEX BREAKDOWN EFFECT IS TO BE INCLUDED.             VS   687
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C          = 0, OTHERWISE.                                                    VS   688
C                                                                             VS   689
C                                                                             VS   690
      READ (INPT,3) LAT,IBLC,KT,IBD                                           VS   691
      WRITE(JPT,3) LAT,IBLC,KT,IBD                                            VS   692
      B2=0.                                                                   VS   693
      DO 1415 I=1,6                                                           VS   694
      XTILT(I)=0.                                                             VS   695
      MX(I)=0                                                                 VS   696
      DO 1415 J=1,10                                                          VS   697
      BREAK(I,J)=0.                                                           VS   698
 1415 CONTINUE                                                                VS   699
      DO 1122 K=1,NSUR                                                        VS   700
      NSS=0                                                                   VS   701
C                                                                             VS   702
C     NC= NUMBER OF SPANWISE SECTIONS ON A SURFACE                            VS   703
C     M1(K,I) = NUMBER OF VORTEX STRIPS IN EACH SECTION                       VS   704
C                                                                             VS   705
C                                                                             VS   706
C  ***NWING = THE NUMERICAL ORDER OF LAST WING SPANWISE SECTION ***           VS   707
C  ** IWGLT=1 IF A WINGLET TO BE REPRESENTED BY A TAIL IS PRESENT **          VS   708
C   ** IWGLT=2 IF THE WINGLET IS AT A LOCATION AWAY FROM THE WING TIP **      VS   709
C     IPOS = WINGLET POSITION INDICATOR AT THE SURFACE TIP. FOR DETAILS,      VS   710
C        SEE INSTRUCTIONS                                                     VS   711
C                                                                             VS   712
      READ (INPT,3)K2,(M1(K,I),I=1,K2),NWING(K),IWGLT(K),                     VS   713
     1IPOS(K)                                                                 VS   714
      NC(K) = K2                                                              VS   715
      WRITE(JPT,3) K2,(M1(K,I),I=1,K2),NWING(K),IWGLT(K),                     VS   716
     1IPOS(K)                                                                 VS   717
      IF(NWING(K).EQ.0) NWING(K)=1                                            VS   718
      IWING(K)=0                                                              VS   719
      IF(IWGLT(K).EQ.0) GO TO 1140                                            VS   720
      NKG=NWING(K)                                                            VS   721
      DO 1141 I=1,NKG                                                         VS   722
      IWING(K)=IWING(K)+M1(K,I)                                               VS   723
 1141 CONTINUE                                                                VS   724
 1140 CONTINUE                                                                VS   725
C                                                                             VS   726
      K2 = NC(K)                                                              VS   727
      DO 1123 KP=1,K2                                                         VS   728
 1123 M1(K,KP)=M1(K,KP)+1                                                     VS   729
C  ***NFP=NUMBER OF FLAP SPANS.                                               VS   730
C     NJW=NUMERICAL ORDERS OF FLAP SPANS AMONG THE SPANWISE SECTIONS*         VS   731
C  *  NOTE. THE NUMBER OF FLAP SPANS IS LIMITED TO FIVE *                     VS   732
C     FOR A CLEAN OR FULL-SPAN FLAP CONFIGURATION, PUT NFP=NJW(1)=1           VS   733
C   * NVRTX=VORTEX STRIP NUMBER AT AND OUTBOARD OF WHICH THE L.E. VORTEX      VS   734
C     LIFT EFFECT IS NOT INCLUDED. IF IT IS ZERO, TOTAL VORTEX LIFT           VS   735
C     EFFECT IS ASSUMED.                                                      VS   736
C     MVRTX=VORTEX STRIP NUMBER INBOARD OF WHICH THE LE VORTEX LIFT
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C       EFFECT IS NOT INCLUDED                                                  VS   737
C      NLEF=1  IF THE FLAPS ARE L.E. FLAPS                                      VS   738
C        =0 FOR T.E. FLAPS                                                      VS   739
C      IV=1 IF THE CORRESPONDING LIFTING SURFACE HAS DIHEDRAL OF 90-DEG         VS   740
C       AND IS NOT SYMMETRICAL ABOUT X-AXIS                                     VS   741
C      NAL=NUMERICAL ORDER OF AILERON SPAN (=0 IF LAT=0)                        VS   742
C                                                                              VS   743
       READ (INPT,3)          K2,(NJW(K,I),I=1,K2),NVRTX(K),MVRTX(K),NLEF(KVS   744
      1),IV(K),NAL(K)                                                          VS   745
       NFP(K) = K2                                                             VS   746
       WRITE (JPT,3)          K2,(NJW(K,I),I=1,K2),NVRTX(K),MVRTX(K),NLEF(KVS   747
      1),IV(K),NAL(K)                                                          VS   748
                                                                               VS   749
C                                                                              VS   750
C     ** FLAP ANGLES IN DEGREES                                                VS   751
       K2 = NFP(K)                                                             VS   752
       READ (INPT,2) (DF(K,I),I=1,K2)                                          VS   753
       WRITE(JPT,2) (DF(K,I),I=1,K2)                                           VS   754
C                                                                              VS   755
       DO 113 I=1,K2                                                           VS   756
       DF(K,I)=DF(K,I)*PI/180.                                                 VS   757
  113  TELP(K,I)=-DF(K,I)                                                      VS   758
C                                                                              VS   759
C    *** NW(I)=NUMBER OF CHORDWISE VORTEX ELEMENTS IN CHORDWISE SECTIONS.       VS   760
C       ICAM=0 FOR ZERO CAMBER                                                 VS   761
C           =1 FOR CAMBER ORDINATES TO BE READ IN                              VS   762
C           =2 IF CAMBER ORDINATES ARE DEFINED ANALYTICALLY IN SUBROUTINE      VS   763
C             ZCDX FOR WING                                                    VS   764
C           =3 IF THERE ARE PLANE L.E. FLAPS ATTACHED TO A PLANE WING. IN      VS   765
C              THIS CASE, IST IS THE NUMBER OF L.E. FLAPS.                     VS   766
C       IST=NUMBER OF SPANWISE STATIONS AT WHICH CAMBER ORDINATES ARE READ     VS   767
C       IN. LIMITED TO 10                                                      VS   768
C       ICAMT=NUMERICAL ORDER OF THE Y-STATION BEYOND WHICH THE INPUT CAM-      VS   769
C             BERS ARE FOR THE WINGLET OR VERTICAL FIN.                        VS   770
C            = 0 IF THERE IS NO CAMBER FOR THE WINGLET OR FIN.                 VS   771
C                                                                              VS   772
       READ (INPT,3) (NW(K,I),I=1,2),ICAM(K),IST(K),ICAMT(K)                   VS   773
       WRITE(JPT,3) (NW(K,I),I=1,2),ICAM(K),IST(K),ICAMT(K)                    VS   774
C                                                                              VS   775
C    *** IF  ICAM=1, READ IN THE X-COORDINATES AND THE CAMBER ORDINATES        VS   776
C       YT=Y-STATION AT WHICH CAMBER ORDINATES ARE TO BE READ IN               VS   777
C        (DIMENSIONAL)                                                         VS   778
C       XNUM=NUMBER OF CAMBER ORDINATES TO BE READ IN. LIMITED TO 21           VS   779
C       CURV=0. IF CAMBER IS FORMED BY CONNECTING STRAIGHT SEGMENTS            VS   780
C              WITH FIRST SEGMENT BEING L.E. FLAP                              VS   781
C           =1. IF CUBIC SPLINE INTERPOLATION IS USED                          VS   782
C           =2. IF CUBIC SPLINE INTERPOLATION IS USED, WITH FIRST SEGMENT      VS   783
C            BEING L.E. FLAP                                                   VS   784
C       CHND=CHORD LENGTH AT YT-STATION                                        VS   785
C       XT=NONDIMENSIONAL X-COORDINATES TO DEFINE CAMBER
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C     CA=NONDIMENSIONAL CAMBER ORDINATES. IF CHND=0., USE ACTUAL (DIMEN-VS   786
C     SIONAL) CAMBER ORDINATE.                                          VS   787
C                                                                       VS   788
      IF(ICAM(K).NE.1) GO TO 191                                        VS   789
      K2 = IST(K)                                                       VS   790
      DO 192 I=1,K2                                                     VS   791
      JJ=I                                                              VS   792
      READ (INPT,2) YT(K,I),XNUM,CURV(K,I),CHND(K,I)                    VS   793
      WRITE(JPT,2) YT(K,I),XNUM,CURV(K,I),CHND(K,I)                     VS   794
      IM(K,I)=XNUM                                                      VS   795
      IR=IM(K,I)                                                        VS   796
      ICV=CURV(K,I)                                                     VS   797
      READ (INPT,2) (XT(K,I,J),J=1,IR)                                  VS   798
      WRITE(JPT,2) (XT(K,I,J),J=1,IR)                                   VS   799
      READ (INPT,2) (CA(J),J=1,IR)                                      VS   800
      WRITE(JPT,2) (CA(J),J=1,IR)                                       VS   801
      DO 194 KO=1,IR                                                    VS   802
  194 AW(KO)=XT(K,I,KO)                                                 VS   803
      IF(ICV.EQ.0) GO TO 197                                            VS   804
      CALL SPLINE (IR,AW,CA,GAMP,GAMX,GAMB,GAMR)                        VS   805
      K3 = IR - 1                                                       VS   806
      DO 193 KO=1,K3                                                    VS   807
      AAM(K,I,KO)=GAMP(KO)                                              VS   808
      BBM(K,I,KO)=GAMX(KO)                                              VS   809
      CCM(K,I,KO)=GAMB(KO)                                              VS   810
  193 DDM(K,I,KO)=GAMR(KO)                                              VS   811
      GO TO 192                                                         VS   812
  197 DO 198 J=2,IR                                                     VS   813
      AAM(K,I,J-1)=0.                                                   VS   814
      BBM(K,I,J-1)=0.                                                   VS   815
      IF(ABS(AW(J)-AW(J-1)).LE.1.E-20) GO TO 190                        VS   816
      CCM(K,I,J-1)=(CA(J)-CA(J-1))/(AW(J)-AW(J-1))                      VS   817
  190 DDM(K,I,J-1)=CA(J-1)                                              VS   818
  198 CONTINUE                                                          VS   819
  192 CONTINUE                                                          VS   820
  191 CONTINUE                                                          VS   821
      IF(ICAM(K).NE.3) GO TO 2005                                       VS   822
C     YLEF(I,1) = EXTREME INBOARD Y-COORDINATE OF A L.E. FLAP.          VS   823
C     YLEF(I,2) = EXTREME OUTBOARD Y-COORDINATE OF A L.E. FLAP.         VS   824
C     X1,Y1,Z1, ETC. ARE CORNER POINT COORDINATES OF A L.E. FLAP, INPUT VS   825
C     IN CLOCKWISE ORDER, FIRST FROM THE MOST INBOARD POINT.            VS   826
      K2 = IST(K)                                                       VS   827
      DO 2006 I=1,K2                                                    VS   828
      READ (INPT,2) (YLEF(K,I,KQ),KQ=1,2)                              VS   829
      WRITE(JPT,2) (YLEF(K,I,KQ),KQ=1,2)                               VS   830
      READ (INPT,2) XLF(K,I,1),YLF(K,I,1),Z1,XLF(K,I,2),YLF(K,I,2),Z2   VS   831
      WRITE(JPT,2) XLF(K,I,1),YLF(K,I,1),Z1,XLF(K,I,2),YLF(K,I,2),Z2    VS   832
      READ (INPT,2) XLF(K,I,3),YLF(K,I,3),Z3,XLF(K,I,4),YLF(K,I,4),Z4   VS   833
      WRITE(JPT,2) XLF(K,I,3),YLF(K,I,3),Z3,XLF(K,I,4),YLF(K,I,4),Z4    VS   834
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      IF(ABS(XLF(K,I,4)-XLF(K,I,1)).GT.1.E-18) SLP1(K,I)=(YLF(K,I,4)-YLFVS   835
     1(K,I,1))/(XLF(K,I,4)-XLF(K,I,1))                                    VS   836
      IF(ABS(XLF(K,I,4)-XLF(K,I,1)).LE.1.E-18) SLP1(K,I)=1.E18            VS   837
      XNF(K,I)=(YLF(K,I,4)-YLF(K,I,1))*(Z3-Z2)-(YLF(K,I,3)-YLF(K,I,2))*  VS   838
     1(Z4-Z1)                                                            VS   839
      YNF(K,I)=(XLF(K,I,3)-XLF(K,I,2))*(Z4-Z1)-(XLF(K,I,4)-XLF(K,I,1))*  VS   840
     1(Z3-Z2)                                                            VS   841
      ZNF(K,I)=(XLF(K,I,4)-XLF(K,I,1))*(YLF(K,I,3)-YLF(K,I,2))-(XLF(K,I,VS   842
     13)-XLF(K,I,2))*(YLF(K,I,4)-YLF(K,I,1))                             VS   843
      IF(ABS(XNF(K,I)).LT.1.E-4.AND.ABS(Z3).GT.1.E-4) GO TO 171           VS   844
      IF(ABS(ZNF(K,I)).GT.1.E-3) GO TO 2006                               VS   845
  171 CONTINUE                                                            VS   846
      XNF(K,I)=(YLF(K,I,4)-YLF(K,I,1))*(Z2-Z1)-(YLF(K,I,2)-YLF(K,I,1))    VS   847
     1*(Z4-Z1)                                                           VS   848
      YNF(K,I)=(XLF(K,I,2)-XLF(K,I,1))*(Z4-Z1)-(XLF(K,I,4)-XLF(K,I,1))*  VS   849
     1(Z2-Z1)                                                            VS   850
      ZNF(K,I)=(XLF(K,I,4)-XLF(K,I,1))*(YLF(K,I,2)-YLF(K,I,1))-(XLF(K,I,VS   851
     12)-XLF(K,I,1))*(YLF(K,I,4)-YLF(K,I,1))                             VS   852
 2006 CONTINUE                                                            VS   853
 2005 CONTINUE                                                            VS   854
      IF(ICAM(K).EQ.0) IST(K)=1                                           VS   855
      NKW=NW(K,1)                                                         VS   856
      L=1                                                                 VS   857
      CHORDT(K,2)=0.                                                      VS   858
      CHORDT(K,3)=0.                                                      VS   859
      CHORDT(K,4)=0.                                                      VS   860
  105 CONTINUE                                                            VS   861
      LL=1                                                                VS   862
      FN=NKW                                                              VS   863
      DO 100 I=1,NKW                                                      VS   864
      FI=I                                                                VS   865
      CPCWL(I)=0.5*(1.-COS((2.*FI-1.)*PI/(2.*FN)))                        VS   866
      SN(K,I,L)=2.*SQRT(CPCWL(I)*(1.-CPCWL(I)))                           VS   867
  100 CPCWL(I)=CPCWL(I)*100.                                              VS   868
      K2 = NC(K)                                                          VS   869
      DO 10 KK=1,K2                                                       VS   870
C                                                                         VS   871
C     IPN=1 IF THE SHAPES OF SECTION LEADING AND TRAILING EDGES ARE       VS   872
C      DEFINED NUMERICALLY.     =0 OTHERWISE                             VS   873
C                                                                         VS   874
      READ (INPT,3) IPN                                                   VS   875
      WRITE(JPT,3) IPN                                                    VS   876
      BREAK(K,KK+5)=IPN                                                   VS   877
C                                                                         VS   878
C  *** COORDINATES OF BREAK CHORDS BOUNDING SPANWISE SECTIONS, FROM       VS   879
C      ROOT TO TIP ON THE RIGHT WING ***                                  VS   880
C  *   DIHED=THE DIHEDRAL ANGLE IN DEGREES FOR THE SECTION *              VS   881
C     FOR NASYM=1, DIHED FOR LEFT WING IS MEASURED FROM NEGATIVE Y-AXIS   VS   882
C      AND IS NEGATIVE UPWARDS                                            VS   883
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C                                                                       VS   884
      READ (INPT,2) ((XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED)              VS   885
      WRITE(JPT,2) ((XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED)               VS   886
      TANL=0.                                                           VS   887
      TANT=0.                                                           VS   888
      IF(K.NE.1) GO TO 15                                               VS   889
      IF(L.EQ.1.AND.KK.EQ.1) TANL=(XXL(2)-XXL(1))/(YL(2)-YL(1))         VS   890
      IF(KK.EQ.1) TANT=(XXT(2)-XXT(1))/(YL(2)-YL(1))                    VS   891
   15 CONTINUE                                                          VS   892
      IF(L.NE.1) GO TO 101                                              VS   893
      CRX(K,KK)=XXL(2)-XXL(1)                                           VS   894
      AUX(K,KK)=XXL(2)                                                  VS   895
      BUX(K,KK)=XXT(2)                                                  VS   896
  101 CONTINUE                                                          VS   897
C  ***IF IPN=0, SKIP THE FOLLOWING INPUT DATA                           VS   898
      IF(IPN.EQ.0) GO TO 2320                                           VS   899
C                                                                       VS   900
C  ***NLE=NUMBER OF INPUT POINTS TO DEFINE THE LE. LIMITED TO 15        VS   901
C     NTE=NUMBER OF INPUT POINTS TO DEFINE THE TE. LIMITED TO 15        VS   902
C     MCVL=1 IF THE CUBIC SPLINE IS USED TO INTERPOLATE THE LE SHAPE    VS   903
C         =0 IF STRAIGHT SEGMENTS ARE ASSUMED FOR THE LE SHAPE          VS   904
C     MCVT=1 IF THE CUBIC SPLINE IS USED TO INTERPOLATE THE TE SHAPE    VS   905
C         =0 IF STRAIGHT SEGMENTS ARE ASSUMED                           VS   906
C                                                                       VS   907
      READ (INPT,3) NLE,NTE,MCVL,MCVT                                   VS   908
      WRITE(JPT,3) NLE,NTE,MCVL,MCVT                                    VS   909
C                                                                       VS   910
C  *** CA, YSL=X-AND Y-COORDINATES OF INPUT POINTS TO DEFINE THE LE     VS   911
C       SHAPE RELATIVE TO THE LE OF INBOARD CHORD                       VS   912
      READ (INPT,2) (CA(I),I=1,NLE)                                     VS   913
      WRITE(JPT,2) (CA(I),I=1,NLE)                                      VS   914
      READ (INPT,2) (YSL(I),I=1,NLE)                                    VS   915
      WRITE(JPT,2) (YSL(I),I=1,NLE)                                     VS   916
      IF(MCVL.EQ.0) GO TO 2321                                          VS   917
      CALL SPLINE (NLE,YSL,CA,AOL,BOL,COL,DOL)                          VS   918
      GO TO 2322                                                        VS   919
 2321 DO 2323 I=2,NLE                                                   VS   920
      AOL(I-1)=0.                                                       VS   921
      BOL(I-1)=0.                                                       VS   922
      COL(I-1)=(CA(I)-CA(I-1))/(YSL(I)-YSL(I-1))                        VS   923
 2323 DOL(I-1)=CA(I-1)                                                  VS   924
C     CA,YST=X- AND Y-COORDINATES OF INPUT POINTS TO DEFINE THE TE SHAPEVS   925
C      RELATIVE TO THE TE OF INBOARD CHORD                              VS   926
 2322 CONTINUE                                                          VS   927
      READ (INPT,2) (CA(I),I=1,NTE)                                     VS   928
      WRITE(JPT,2) (CA(I),I=1,NTE)                                      VS   929
      READ (INPT,2) (YST(I),I=1,NTE)                                    VS   930
      WRITE(JPT,2) (YST(I),I=1,NTE)                                     VS   931
      IF(MCVT.EQ.0) GO TO 2324                                          VS   932
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      CALL SPLINE(NTE,YST,CA,AOT,BOT,COT,DOT)                                VS   933
      GO TO 2320                                                             VS   934
 2324 DO 2325 I=2,NTF                                                        VS   935
      AOT(I-1)=0.                                                            VS   936
      BOT(I-1)=0.                                                            VS   937
      COT(I-1)=(CA(I)-CA(I-1))/(YST(I)-YST(I-1))                             VS   938
 2325 DOT(I-1)=CA(I-1)                                                       VS   939
 2320 CONTINUE                                                               VS   940
      RT2=(XXT(2)-XXT(1))/(YL(2)-YL(1))                                      VS   941
      IF(NASYM.EQ.1.AND.YL(1).LT.0.) GO TO 2311                              VS   942
      SKP=ATAN(RT2)                                                          VS   943
      TPR=(XXT(2)-XXL(2))/(XXT(1)-XXL(1))                                    VS   944
      CBB=2./3.*(XXT(1)-XXL(1))*(1.+TPR+TPR*TPR)/(1.+TPR)                    VS   945
      GO TO 2312                                                             VS   946
 2311 IF(ABS(RT2).GT.1.E-7) RT2=-RT2                                         VS   947
      SKP=ATAN(RT2)                                                          VS   948
      TPR=(XXT(1)-XXL(1))/(XXT(2)-XXL(2))                                    VS   949
      CBB=2./3.*(XXT(2)-XXL(2))*(1.+TPR+TPR*TPR)/(1.+TPR)                    VS   950
 2312 CONTINUE                                                               VS   951
      COX=CBB*COS(SKP)                                                       VS   952
      H=YL(2)-YL(1)                                                          VS   953
      COY=H*(1.+2.*TPR)/(1.+TPR)/3.                                          VS   954
      DUMT(1,K,KK)=SKP                                                       VS   955
      DUMT(2,K,KK)=1.0662*COS(SKP)*(H*COX/(COY*COY))**0.2                    VS   956
      YBREAK(K,KK)=YL(2)                                                     VS   957
      FM=M1(K,KK)                                                            VS   958
      NSW=M1(K,KK)                                                           VS   959
      IF(K.EQ.1) XXLE=XXL(1)                                                 VS   960
      IF(K.EQ.1) XXTE=XXT(1)                                                 VS   961
      IF(ABS(YL(1)).LT.0.001.AND.K.EQ.1) DIST=DIST+XXT(1)-XXL(1)             VS   962
      DO 120 J=1,NSW                                                         VS   963
      FJ=J                                                                   VS   964
      CPSWL(J)=0.5*(1.-COS((2.*FJ-1.)*PI/(2.*FM)))*100.                      VS   965
      YCON(J)=0.5*(1.-COS(FJ*PI/FM))                                         VS   966
      SJ(K,J,KK)=SIN(FJ*PI/FM)                                               VS   967
  120 CONTINUE                                                               VS   968
      IF (DIHED.GT.5.) IDIH=1                                                VS   969
      DCOS(K,KK)=COS(DIHED*PI/180.)                                          VS   970
      DSIN(K,KK)=SIN(DIHED*PI/180.)                                          VS   971
      IF(KK.EQ.NC(K)) GO TO 130                                              VS   972
      IF(IWING(K).NE.0.AND.KK.EQ.NWING(K)) GO TO 130                         VS   973
      CPSWL(NSW)=100.                                                        VS   974
      IF(NASYM.EQ.1 .AND. KK.EQ.1) GO TO 135                                 VS   975
      CPSWL(1)=0.                                                            VS   976
      GO TO 135                                                              VS   977
  130 CPSWL(1)=0.                                                            VS   978
      IF(IWGLT(K).EQ.1.AND.KK.EQ.NWING(K)) CPSWL(NSW)=100.                   VS   979
  135 IF(KK.EQ.NJW(K,LL)) MJW1(K,L,LL)=IPANEL                                VS   980
      NCW=NKW                                                                VS   981
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                                                                      VS   982
      KA=K                                                            VS   983
      CALL PANEL(XXL,YL,XXT,CPCWL,CPSWL,NSW,IPANEL,LPANEL,ZS,L,KA,IPN) VS   984
      IPANEL=LPANEL+1                                                 VS   985
      NCS=NCS+NSW-1                                                   VS   986
      NSS=NSS+NSW-1                                                   VS   987
      IF(L.EQ.1.AND.NW(K,2).EQ.0) B2=B2+FLOAT(NSW)-1.                 VS   988
      IF(L.EQ.2) B2=B2+FLOAT(NSW)-1.                                  VS   989
       IF(KK.EQ.NC(K)) B2=B2+1.                                       VS   990
      WIDTH(K,KK)=YL(2)-YL(1)                                         VS   991
      BREAK(K,KK)=YL(1)                                               VS   992
      IF(KK.EQ.NJW(K,LL)) MJW2(K,L,LL)=LPANEL                         VS   993
      IF(NASYM.EQ.1.AND.KK.EQ.1) GO TO 2105                           VS   994
      IF(IWING(K).NE.0.AND.KK.EQ.NWING(K)) GO TO 11                   VS   995
      IF(KK.NE.NC(K)) GO TO 112                                       VS   996
   11 IF(KK.EQ.NC(K).AND.IWING(K).NE.0) GO TO 9                       VS   997
      CHORDT(K,L)=XXT(2)-XXL(2)                                       VS   998
      HALFB(K)=YL(2)                                                  VS   999
      YCN(K,L)=XXL(2)                                                 VS  1000
      GO TO 112                                                       VS  1001
 2105 CHORDT(K,L+2)=XXT(1)-XXL(1)                                     VS  1002
      YCN(K,L+2)=XXL(1)                                               VS  1003
      GO TO 112                                                       VS  1004
    9 CHORDT(K,L+2)=XXT(2)-XXL(2)                                     VS  1005
      HALFBH(K)=YL(2)                                                 VS  1006
      YCN(K,L+2)=XXL(2)                                               VS  1007
  112 IF(KK.EQ.NJW(K,LL)) LL=LL+1                                     VS  1008
   10 CONTINUE                                                        VS  1009
      IF (L .EQ. 2) GO TO 107                                         VS  1010
      LPAN1(K)=LPANEL                                                 VS  1011
      IF (NW(K,2).EQ.0) GO TO 106                                     VS  1012
      L=2                                                             VS  1013
      NKW=NW(K,2)                                                     VS  1014
      GO TO 105                                                       VS  1015
  106 K2 = NFP(K)                                                     VS  1016
      DO 111 I=1,K2                                                   VS  1017
      MJW1(K,2,I)=0                                                   VS  1018
  111 MJW2(K,2,I)=0                                                   VS  1019
      NSS=NSS*2                                                       VS  1020
  107 CONTINUE                                                        VS  1021
      LPN(K)=LPANEL                                                   VS  1022
      IF(K.EQ.1) NS(K)=NSS/2                                          VS  1023
      IF(K.GT.1) NS(K)=NS(K-1)+NSS/2                                  VS  1024
C     WRITE(JPT,3) NS(K),LPN(K),LPAN1(K),LPANEL                       VS  1025
      IF(NVRTX(K).EQ.0) NVRTX(K)=NS(K)+1                              VS  1026
      IF(IWGLT(K).NE.0) IV(K)=0                                       VS  1027
 1122 CONTINUE                                                        VS  1028
      TANC2=0.5*(TANL+TANT)                                           VS  1029
C                                                                     VS  1030
C *** AM = MACH NUMBER
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C      HALFSW = REFERENCE HALF WING AREA (IF PLANFORM IS NOT SYMMETRICAL VS  1031
C       ABOUT X-AXIS, SET HALFSW=TOTAL AREA)                            VS  1032
C      CREF = REFERENCE CHORD                                           VS  1033
C      BREF2=RFFERENCE HALF SPAN                                        VS  1034
C      ALPCON=1. IF ALPHA=1. RADIAN (IN THIS CASE,PUT ALPHA=0. AND      VS  1035
C       DF =0.).    =0. OTHERWISE                                       VS  1036
C      IF ALPCON = 2., THE CALCULATION IS FOR ONE DESIGN LIFT COEFFICIENTVS  1037
C         BASED ON THE ATTACHED-FLOW THEORY                            VS  1038
C               = 3. IF THE DESIGN LIFT COEFFICIENT IS BASED ON THE    VS  1039
C         VORTEX FLOW THEORY                                           VS  1040
C                                                                      VS  1041
      READ (INPT,2) AM,HALFSW,CREF,BREF2,XREF,ALPCON                   VS  1042
      WRITE(JPT,2)  AM,HALFSW,CREF,BREF2,XREF,ALPCON                   VS  1043
      IF(AM.GT.1.) GO TO 20                                            VS  1044
      GO TO 21                                                         VS  1045
   20 WRITE(JPT,22)                                                    VS  1046
   22 FORMAT(/2X,34H*** THIS JOB IS ABORTED IN GEMTRY.,/5X,43HA SUPERSONVS  1047
     1IC MACH NUMBER IS NOT ALLOWED ***)                               VS  1048
      STOP                                                             VS  1049
   21 CONTINUE                                                         VS  1050
C                                                                      VS  1051
C  *** THE FOLLOWING DATA SHOULD BE ALL 0. IF ALPCON=1.                VS  1052
C      ALNM=NUMBER OF ALPHA TO BE EVALUATED.                           VS  1053
C      SNUM=NUMBER OF SPANWISE STATIONS INVOLVING LIFT AUGMENTATION    VS  1054
C      DVRTX = 1. IF AN ADDITIONAL DISCRETE VORTEX IS NEEDED TO        VS  1055
C        CALCULATE THE AUGMENTED VORTEX LIFT EFFECT.  =0. OTHERWISE.   VS  1056
C      CLDS = DESIGN LIFT COEFFICIENT IF ALPCON = 2. OR 3.             VS  1057
C           = 0 OTHERWISE                                              VS  1058
C                                                                      VS  1059
C      SNI,SNE = SPANWISE STRIP NUMBERS AT WHICH AND WITHIN WHICH THE  VS  1060
C       LEADING-EDGE VORTEX PRODUCES LIFT AUGMENTATION ON A DOWNSTREAM VS  1061
C       SURFACE.    =0. IF THERE IS NO VORTEX LIFT AUGMENTATION.       VS  1062
C      CTILT = CHARACTERISTIC LENGTH FOR AUGMENTED VORTEX EFFECT. MAY BE VS  1063
C       POSITIVE OR NEGATIVE.                                          VS  1064
C      SLETH = LE LENGTH                                               VS  1065
C      XCNTD = X-COORDINATE OF THE CENTROID OF AUGMENTED VORTEX LIFT.  VS  1066
C      YCNTD=Y-COORDINATE OF THE CENTROID OF AUGMENTED VORTEX LIFT     VS  1067
C      XTILT = EQUIVALENT X-DISTANCE CREATING AN ADVERSE PRESSURE      VS  1068
C       GRADIENT OVER WHICH THE VORTEX IS ASSUMED TO PASS.             VS  1069
C      SR = THE LIFTING-SURFACE NUMBER RECEIVING THE AUGMENTED VORTEX  VS  1070
C       LIFT EFFECT.                                                   VS  1071
C                                                                      VS  1072
      READ(INPT,2) ALNM,SNUM,DVRTX,CLDS                                VS  1073
      WRITE(JPT,2) ALNM,SNUM,DVRTX,CLDS                                VS  1074
      ALPI=0.                                                          VS  1075
      ALPINC=0.                                                        VS  1076
C                                                                      VS  1077
      KALP=ALPCON                                                      VS  1078
      IF(KALP.GE.2) ALPCON=0.                                          VS  1079
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      IAGVX=DVRTX                                                        VS  1080
      NAUG=IAGVX                                                         VS  1081
      INUM=SNUM                                                          VS  1082
      IF(INUM.EQ.0) INUM=1                                               VS  1083
      NALP=ALNM                                                          VS  1084
      IF(NALP.EQ.0) NALP=1                                               VS  1085
C     ANGLES OF ATTACK IN DEGREES. IF THERE ARE CAMBER, L.E.FLAP         VS  1086
C     AND/OR ROUNDED L.E.,START WITH A HIGH VALUE OF ANGLES.ALNM NUMBERSVS  1087
C                                                                        VS  1088
      ALPA(1)=0.                                                         VS  1089
      IF(KALP.EQ.1) GO TO 2110                                           VS  1090
      READ(INPT,2)(ALPA(I),I=1,NALP)                                     VS  1091
      WRITE(JPT,2)(ALPA(I),I=1,NALP)                                     VS  1092
      DO 2111 I=1,NALP                                                   VS  1093
 2111 ALPA(I)=ALPA(I)*CNET                                               VS  1094
 2110 CONTINUE                                                           VS  1095
      IF(KALP.GE.2) NALP=10                                              VS  1096
      DO 2090 I=1,INUM                                                   VS  1097
      READ(INPT,2) SNI,SNE,CTILT(I),SLETH(I),XCNTD(I),YCNTD(I),XTILT(I),VS  1098
     1SR                                                                 VS  1099
      WRITE(JPT,2) SNI,SNE,CTILT(I),SLETH(I),XCNTD(I),YCNTD(I),XTILT(I),VS  1100
     1SR                                                                 VS  1101
      IF(SLETH(I).LT.1.E-8) SLETH(I)=1.                                  VS  1102
      NVL1(I)=SNI                                                        VS  1103
      NVL2(I)=SNE                                                        VS  1104
      NUR(I)=SR                                                          VS  1105
      IF(NUR(I).EQ.0) NUR(I)=1                                           VS  1106
 2090 XCNTD(I)=XCNTD(I)-XREF                                             VS  1107
      NVL1(INUM+1)=0                                                     VS  1108
      NVL2(INUM+1)=0                                                     VS  1109
      NUMS=SNUM                                                          VS  1110
      ALPI=ALPI*PI/180.                                                  VS  1111
      ALPINC=ALPINC*PI/180.                                              VS  1112
      ALP=ALPA(1)                                                        VS  1113
      ALO=ALP                                                            VS  1114
      NCS=NS(NSUR)                                                       VS  1115
      IALP=ALPCON                                                        VS  1116
      IF(IALP.EQ.1) IBD=0                                                VS  1117
      DO 1124 K=1,NSUR                                                   VS  1118
      ALPBD(K,1)=PIA                                                     VS  1119
      ALPBD(K,2)=PIA                                                     VS  1120
      ABD(K,1)=PIA                                                       VS  1121
      ABD(K,2)=PIA                                                       VS  1122
      ALBDBR(K,1)=PIA                                                    VS  1123
      ALBDBR(K,2)=PIA                                                    VS  1124
      ALBDBL(K,1)=PIA                                                    VS  1125
      ALBDBL(K,2)=PIA                                                    VS  1126
      ABDR(K,1)=PIA                                                      VS  1127
      ABDR(K,2)=PIA                                                      VS  1128
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      ABDL(K,1)=PIA                                                     VS  1129
      ABDL(K,2)=PIA                                                     VS  1130
      IF(IALP.EQ.1) KT=0                                                VS  1131
      K2 = NS(K)                                                        VS  1132
      DO 1118 I=1,K2                                                    VS  1133
 1118 RC(K,I)=0.                                                        VS  1134
C   * IF KT = 0, THE FOLLOWING 2 INPUT LISTS MUST BE SKIPPED.           VS  1135
      IF(KT.EQ.0) GO TO 1119                                            VS  1136
C  *** THE INPUT LEADING-EDGE RADIUS IS DEFINED IN THE STREAMWISE       VS  1137
C      DIRECTION.                                                       VS  1138
C  *** ICNLE = 0 FOR CONSTANT LE RADIUS/LOCAL-CHORD RATIO. IN THIS CASE,VS  1139
C       THIS RATIO IS THE ONLY INPUT.                                   VS  1140
C            = 1 FOR CONSTANT LE RADIUS. IN THIS CASE, ONLY THIS VALUE  VS  1141
C       OF RADIUS IS INPUT.                                             VS  1142
C            = 2 FOR VARIABLE LE RADIUS-CHORD RATIO. IN THIS CASE, ALL  VS  1143
C       VALUES OF THIS RATIO AT SPANWISE CONTROL STATIONS (NCS VALUES)  VS  1144
C       MUST BE READ IN.                                                VS  1145
      READ (INPT,3) ICNLE(K)                                            VS  1146
      WRITE(JPT,3) ICNLE(K)                                             VS  1147
      NMR=1                                                             VS  1148
      IF (ICNLE(K).EQ.2) NMR=NS(K)                                      VS  1149
C                                                                       VS  1150
      READ (INPT,2) (RC(K,I),I=1,NMR)                                   VS  1151
      WRITE(JPT,2) (RC(K,I),I=1,NMR)                                    VS  1152
C                                                                       VS  1153
 1119 CONTINUE                                                          VS  1154
C     THE FOLLOWING INPUT DATA ARE NOT NEEDED IF ALPCON =1.             VS  1155
      IF (IALP .EQ.1) GO TO 1124                                        VS  1156
C     TWST = 1. IF THERE IS GEOMETRIC TWIST                             VS  1157
C          = 0. OTHERWISE                                               VS  1158
C     RINC = INCIDENCE ANGLE IN DEGREES                                 VS  1159
C     TINP = INCIDENCE ANGLE OF WINGLET OR VERTICAL FIN IN DEGREES,     VS  1160
C            RELATIVE TO THE ROOT OF THE LIFTING SURFACE                VS  1161
C                                                                       VS  1162
      READ (INPT,2) TWST,RINC(K),TINP(K)                                VS  1163
      WRITE(JPT,2) TWST,RINC(K),TINP(K)                                 VS  1164
      ITWST(K)=TWST                                                     VS  1165
      RINC(K)=RINC(K)*PI/180.                                           VS  1166
      TINP(K)=TINP(K)*PI/180.                                           VS  1167
      IF (ITWST(K).EQ.0) GO TO 1124                                     VS  1168
C *** YNUM=NUMBER OF Y-COORDINATES INPUT TO DESCRIBE TWIST DISTRIBUTION VS  1169
C     TCURV=0. IF THE TWIST DISTRIBUTION  IS  PIECEWISE LINEAR          VS  1170
C          =1. IF IT IS CONTINUOUSLY VARYING                            VS  1171
C                                                                       VS  1172
      READ (INPT,2) YNUM,TCURV                                          VS  1173
      WRITE(JPT,2) YNUM,TCURV                                           VS  1174
      NYM(K)=YNUM                                                       VS  1175
      NTCV=TCURV                                                        VS  1176
C  *** YTS=THE NONDIMENSIONAL Y-COORDINATES AT WHICH TWIST ANGLES ARE   VS  1177
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C      DEFINED. LIMITES TO 21.                                                  VS  1178
C      FOR WINGLETS OR VERTICAL FINS, THE HALF SPAN OF THE ATTACHED             VS  1179
C        LIFTING SURFACE IS USED TO DEFINE YTS                                  VS  1180
C      CA=THE CORRESPONDING TWIST ANGLES IN DEGREES.NEGATIVE FOR WASHOUT        VS  1181
C                                                                               VS  1182
       K2 = NYM(K)                                                              VS  1183
       READ (INPT,2) (YTS(K,I),I=1,K2)                                          VS  1184
       WRITE(JPT,2) (YTS(K,I),I=1,K2)                                           VS  1185
       READ (INPT,2) (CA(I),I=1,K2)                                             VS  1186
       WRITE(JPT,2) (CA(I),I=1,K2)                                              VS  1187
       NQ=NYM(K)                                                                VS  1188
       DO 1128 KQ=1,NQ                                                          VS  1189
 1128  AW(KQ)=YTS(K,KQ)                                                         VS  1190
       IF (NTCV.EQ.0) GO TO 1127                                                VS  1191
       CALL SPLINE(NQ,AW,CA,GAMP,GAMX,GAMB,GAMR)                                VS  1192
       K2 = NQ - 1                                                              VS  1193
       DO 1129 KQ=1,K2                                                          VS  1194
       AY(K,KQ)=GAMP(KQ)                                                        VS  1195
       BY(K,KQ)=GAMX(KQ)                                                        VS  1196
       CCY(K,KQ)=GAMB(KQ)                                                       VS  1197
 1129  DY(K,KQ)=GAMR(KQ)                                                        VS  1198
       GO TO 1124                                                               VS  1199
 1127  DO 1131 J=2,NQ                                                           VS  1200
       AY(K,J-1)=0.                                                             VS  1201
       BY(K,J-1)=0.                                                             VS  1202
       CCY(K,J-1)=(CA(J)-CA(J-1))/(AW(J)-AW(J-1))                               VS  1203
 1131  DY(K,J-1)=CA(J-1)                                                        VS  1204
 1124  CONTINUE                                                                 VS  1205
C                                                                               VS  1206
C  *** HEIGHT=HEIGHT OF 3/4 CHORD POINT OF M.A.C. FROM GROUND IF NGRD=1,        VS  1207
C      =0. OTHERWISE.   ATT=PITCH ATTITUDE OF WING IN DEGREES,                  VS  1208
C      =0. IF NGRD=0.                                                           VS  1209
C                                                                               VS  1210
       READ (INPT,2) HEIGHT,ATT                                                 VS  1211
       WRITE (JPT,2) HEIGHT,ATT                                                 VS  1212
       ATT=SIN(ATT*PI/180.)                                                     VS  1213
       ICAMB=0                                                                  VS  1214
       IF(ICAM(1).EQ.2) ICAMB=1                                                 VS  1215
       DIST=DIST*2                                                              VS  1216
       IF(DIST.LT.HALFB(1)) DIST=HALFB(1)                                       VS  1217
C                                                                               VS  1218
C  *   P=P*B/(2.*V) =MAXIMUM ROLL HELICAL ANGLE IN RADIAN                       VS  1219
C      BK=SIDE SLIP ANGLE IN RADIAN                                             VS  1220
C      RL=R*B/(2.*V) =YAW RATE PARAMETER                                        VS  1221
C       IF RL=0., THE YAW RATE PARAMETER WILL BE CALCULATED AS P*SIN(ALP)VS  1222
C       ,AND ROLL RATE PARAMETER AS P*COS(ALP).                                 VS  1223
C      CFF = SKIN FRICTION COEFFICIENT BASED ON MEAN AERODYNAMIC                VS  1224
C       CHORD IF IBLC = 1.   =0, OTHERWISE.                                     VS  1225
C      PBK = 1. IF ROLL DAMPING IS OBTAINED IN A NONZERO SIDESLIP. =0.          VS  1226
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C        OTHERWISE                                                      VS  1227
C                                                                       VS  1228
C                                                                       VS  1229
      P=0.                                                              VS  1230
      BK=0.                                                             VS  1231
      RL=0.                                                             VS  1232
      CFF=0.                                                            VS  1233
      PBK=0.                                                            VS  1234
      PPT = 0.                                                          VS  1235
      IF(LAT .NE. 1) GO TO 1002                                         VS  1236
      READ (INPT,2) P,BK,RL,CFF,PBK                                     VS  1237
      WRITE(JPT,2) P,BK,RL,CFF,PBK                                      VS  1238
 1002 CONTINUE                                                          VS  1239
C                                                                       VS  1240
      IF(LAT.EQ.1 .AND. ABS(P).LT.0.00001) P=0.1                        VS  1241
      IF(LAT.EQ.1 .AND. ABS(BK).LT.0.00001) BK=0.1                      VS  1242
      P=P*1000.                                                         VS  1243
      MP=P                                                              VS  1244
      P=MP/1000.                                                        VS  1245
      IF(LAT.NE.1) GO TO 50                                             VS  1246
      BKK=0.                                                            VS  1247
      IF(PBK.GT.0.01) BKK=BK                                            VS  1248
      PPT=P                                                             VS  1249
      IF(P.LT.0.05) P=0.05                                              VS  1250
      DO 51 K=1,NSUR                                                    VS  1251
      K2 = NC(K)                                                        VS  1252
      DO 51 KK=1,K2                                                     VS  1253
      SKK=DUMT(1,K,KK)                                                  VS  1254
      SKP=SKK-BKK                                                       VS  1255
      SKO=DUMT(2,K,KK)*COS(BKK)*COS(SKP)/(COS(SKK)*P**0.2)              VS  1256
      SKO=ATAN(SKO)                                                     VS  1257
      SWPP(K,KK)=COS(SKP)/COS(SKO)                                      VS  1258
C     WRITE(JPT,2) SKP,SKO,SWPP(K,KK)                                   VS  1259
   51 CONTINUE                                                          VS  1260
   50 CONTINUE                                                          VS  1261
      LWF=LPANEL                                                        VS  1262
      IF(BREF2.LT.1.E-3) BREF2=HALFB(1)                                 VS  1263
      NTL=0                                                             VS  1264
      KW=0                                                              VS  1265
      WKN=0.                                                            VS  1266
      RDX=0.                                                            VS  1267
C                                                                       VS  1268
C  *** KF=1 IF THE FUSELAGE IS PRESENT, =0 OTHERWISE. NT=NUMBER OF      VS  1269
C      FOURIER TERMS EXCLUDING THE ZERO-ORDER TERM. NCUM=NUMBER OF CIR- VS  1270
C      CUMFERENTIAL LOCATIONS AT WHICH PRESSURE LOADING IS TO BE COMPUTEDVS  1271
C      . NF=NUMBER OF CONTROL STATIONS ALONG THE FUSELAGE AXIS ***      VS  1272
C  *   FOR MIDWING CONFIGURATIONS, USE EVEN NUMBERS FOR NCUM *          VS  1273
C                                                                       VS  1274
      READ(INPT,3) KF,NT,NCUM,NF                                        VS  1275
      WRITE(JPT,3) KF,NT,NCUM,NF
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      KW=1                                                                  VS  1276
      NKF(1)=NF                                                             VS  1277
      NKF(2)=0                                                              VS  1278
      IF (KF .EQ. 0) GO TO 1040                                             VS  1279
      NTL=NT*NF                                                             VS  1280
      KW1=KW+1                                                              VS  1281
C                                                                           VS  1282
C *** X-COORDINATES DEFINING THE FUSELAGE SEGMENTS,INCLUDING THE NOSE       VS  1283
C     AND THE TAIL, FUSIND=0. IF THE FUSELAGE GEOMETRY IS TO BE DEFINED     VS  1284
C     ANALYTICALLY IN FUNCTIONS FUR(X) AND SLOP(X), =1. OTHERWISE.....      VS  1285
C     FUSNO=NUMBER OF FUSELAGE STATIONS TO BE INPUT TO DEFINE THE           VS  1286
C     SHAPE IF FUSIND=1. , =0. OTHERWISE ***                                VS  1287
C *** FSHAP =1. IF THE INPUT FUSELAGE SHAPE IS TO BE INTERPOLATED            VS  1288
C     THROUGH CUBIC SPLINE INTERPOLATION                                    VS  1289
C           =0. IF INPUT POINTS FOR THE FUSELAGE SHAPE ARE CONNECTED        VS  1290
C            WITH STRAIGHT SEGMENTS                                         VS  1291
C           = ARBITRARY IF FUSIND=0.                                        VS  1292
C   *  X1=BODY STATION IN FRACTION OF BODY LENGTH AT WHICH THE RATE OF       VS  1293
C     CHANGE OF CROSS-SECTIONAL AREA WITH BODY LENGTH FIRST REACHES         VS  1294
C     MAXIMUM NEGATIVE VALUE. SEE DATCOM *                                  VS  1295
C                                                                           VS  1296
      READ(INPT,2)(XAS(I),I=1,KW1),FUSIND,FUSNO,FSHAP,X1                    VS  1297
      WRITE(JPT,2)(XAS(I),I=1,KW1),FUSIND,FUSNO,FSHAP,X1                    VS  1298
      IF(X1.LT.0.01) X1=1.                                                  VS  1299
      IF(X1.GT.1.) X1=1.                                                    VS  1300
      IFR=FUSIND                                                            VS  1301
      IFN=FUSNO                                                             VS  1302
      IFSP=FSHAP                                                            VS  1303
C  ***IF FUSIND=1., READ IN THE FUSELAGE X-STATIONS AND THE RADII.          VS  1304
C     OTHERWISE, SKIP ***                                                   VS  1305
      IF (IFR .EQ. 0) GO TO 26                                              VS  1306
      READ(INPT,2) (XFF(I),I=1,IFN)                                         VS  1307
      READ(INPT,2) (RFF(I),I=1,IFN)                                         VS  1308
      WRITE(JPT,2) (XFF(I),I=1,IFN)                                         VS  1309
      WRITE(JPT,2) (RFF(I),I=1,IFN)                                         VS  1310
      IF(IFSP.EQ.0) GO TO 250                                               VS  1311
      CALL SPLINE (IFN,XFF,RFF,AAF,BBF,CCF,DDF)                             VS  1312
      GO TO 26                                                              VS  1313
  250 DO 251 J=2,IFN                                                        VS  1314
      AAF(J-1)=0.                                                           VS  1315
      BBF(J-1)=0.                                                           VS  1316
      CCF(J-1)=(RFF(J)-RFF(J-1))/(XFF(J)-XFF(J-1))                          VS  1317
  251 DDF(J-1)=RFF(J-1)                                                     VS  1318
   26 CONTINUE                                                              VS  1319
      XLEF=XAS(1)                                                           VS  1320
      XTEF=XAS(KW1)                                                         VS  1321
      IF (YN(2,1) .LE. 0.01) GO TO 31                                       VS  1322
      IF (ZCP(2) .GE. 0.) TH1=PI/2.-ATAN(ZCP(2)/YN(2,1))                    VS  1323
      IF (ZCP(2) .LT. 0.) TH1=PI/2.+ATAN(ABS(ZCP(2))/YN(2,1))               VS  1324
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      IF (ZCP(2) .LT. 0.) GO TO 53                                      VS  1325
      IF (ABS(ZCP(2)) .LE. 0.001) GO TO 54                              VS  1326
      F1=TH1/PI*FLOAT(NCUM)                                             VS  1327
      NH1=F1                                                            VS  1328
      IF (NH1 .LT. 2) NH1=2                                             VS  1329
      GO TO 32                                                          VS  1330
   53 TH2=PI-TH1                                                        VS  1331
      F2=TH2/PI*FLOAT(NCUM)                                             VS  1332
      NH2=F2                                                            VS  1333
      IF (NH2 .LT. 2) NH2=2                                             VS  1334
      NH1=NCUM-NH2                                                      VS  1335
      GO TO 32                                                          VS  1336
   54 NH1=NCUM/2                                                        VS  1337
      GO TO 32                                                          VS  1338
   31 NH1=0                                                             VS  1339
      TH1=0                                                             VS  1340
   32 CONTINUE                                                          VS  1341
      SNP(5,20)=TH1                                                     VS  1342
      SNP(5,19)=NH1                                                     VS  1343
      CALL GEOFUS                                                       VS  1344
      LWF=LPANEL+NTL                                                    VS  1345
      WKN=-8.*PI*RDX                                                    VS  1346
 1040 CONTINUE                                                          VS  1347
      IF(LWF.GT.195) GO TO 23                                           VS  1348
      GO TO 24                                                          VS  1349
   23 WRITE(JPT,25)                                                     VS  1350
   25 FORMAT(/2X,34H*** THIS JOB IS ABORTED IN GEMTRY.,/5X,37HTOTAL NUMBVS  1351
     1ER OF UNKNOWNS EXCEEDS 195.,/5X,56HDIMENSIONS FOR GAMMA AND DQ IN VS  1352
     2DWASH MUST BE CHANGED ***)                                        VS  1353
      STOP                                                              VS  1354
   24 CONTINUE                                                          VS  1355
      P=PPT                                                             VS  1356
      PT=P                                                              VS  1357
      IRL=0                                                             VS  1358
      IF(ABS(RL).LT.0.0001) IRL=1                                       VS  1359
      WRITE (JPT,4) HALFSW,CREF                                         VS  1360
      WRITE (JPT,403)                                                   VS  1361
      WRITE (JPT,412)                                                   VS  1362
      WRITE(JPT,7) (XN(I,1),XN(I,2),YN(I,1),YN(I,2),ZN(I,1),ZN(I,2),I=1,VS  1363
     1LPANEL)                                                           VS  1364
      WRITE (JPT,404)                                                   VS  1365
      WRITE (JPT,411)                                                   VS  1366
      WRITE (JPT,7) (XCP(I),YCP(I),ZCP(I),I=1,LPANEL)                   VS  1367
      J1=LWF+1                                                          VS  1368
      B=1.-AM*AM                                                        VS  1369
      B2=B                                                              VS  1370
      ALZ=ALP*180./PI                                                   VS  1371
      REWIND 04                                                         VS  1372
      REWIND 02                                                         VS  1373
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      ICOUNT=0                                                          VS  1374
      DO 2000 I=1,NCS                                                   VS  1375
 2000 CNALP(I)=0.                                                       VS  1376
      NCG=10                                                            VS  1377
      FN=NCG                                                            VS  1378
      DO 2010 I=1,NCG                                                   VS  1379
      FI=I                                                              VS  1380
      AG=(2.*FI-1.)*PI/(2.*FN)                                          VS  1381
      CTG(I)=COS(AG)                                                    VS  1382
 2010 STG(I)=SIN(AG)                                                    VS  1383
      RETURN                                                            VS  1384
      END                                                               VS  1385
C      FORTRAN NLSTIN                                                   VS  1386
      SUBROUTINE GEOFUS                                                 VS  1387
C     TO GENERATE THE FUSELAGE GEOMETRY                                 VS  1388
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS  1389
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,X1   VS  1390
      PI=3.14159265                                                     VS  1391
      S=XTEF-XLEF                                                       VS  1392
      TH1=SNP(5,20)                                                     VS  1393
      NH1=SNP(5,19)                                                     VS  1394
      RDX=SLOP(XLEF)                                                    VS  1395
      NF1=NF+1                                                          VS  1396
      FNT=NT                                                            VS  1397
      DO 20 I=1,NT                                                      VS  1398
      FI=I                                                              VS  1399
      DO 20 K=1,NCUM                                                    VS  1400
      IF (NH1 .NE. 0 .AND. K .LE. NH1) GO TO 10                         VS  1401
      FK=K-NH1                                                          VS  1402
      FCUM=NCUM-NH1                                                     VS  1403
      PP=PI-TH1                                                         VS  1404
      TP=TH1                                                            VS  1405
      GO TO 11                                                          VS  1406
   10 FK=K                                                              VS  1407
      FCUM=NH1                                                          VS  1408
      PP=TH1                                                            VS  1409
      TP=0.                                                             VS  1410
   11 CONTINUE                                                          VS  1411
      TA=(2.*FK-1.)*PP/(2.*FCUM)+TP                                     VS  1412
   20 CSF(I,K)=COS(FI*TA)                                               VS  1413
      IK=0                                                              VS  1414
      FNF=NKF(1)                                                        VS  1415
      XO=XAS(1)                                                         VS  1416
      N2=1                                                              VS  1417
      N1=NKF(1)                                                         VS  1418
      SL=XAS(2)-XAS(1)                                                  VS  1419
      DO 1 I=1,NF                                                       VS  1420
      M=I-IK                                                            VS  1421
      FI=M                                                              VS  1422
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      XF(I)=XO  +0.5*SL*(1.-COS((2.*FI-1.)*PI/(2.*FNF)))                VS  1423
      XCF(I)=XO  +0.5*SL*(1.-COS(FI*PI/FNF))                            VS  1424
      SNP(N2,M)=SIN((2.*FI-1.)*PI/(2.*FNF))                             VS  1425
      XC=XCF(I)                                                         VS  1426
      RF(I)=FUR(XC)                                                     VS  1427
      IF(I.NE.N1.OR.I.EQ.NF) GO TO 1                                    VS  1428
      N2=N2+1                                                           VS  1429
      IK=N1                                                             VS  1430
      N1=N1+NKF(N2)                                                     VS  1431
      SL=XAS(N2+1)-XAS(N2)                                              VS  1432
      FNF=NKF(N2)                                                       VS  1433
      XO=XAS(N2)                                                        VS  1434
    1 CONTINUE                                                          VS  1435
    2 FORMAT (8F10.5)                                                   VS  1436
      RETURN                                                            VS  1437
      END                                                               VS  1438
C      FORTRAN NLSTIN                                                   VS  1439
      SUBROUTINE PANEL (XXL,YL,XXT,CPCWL,CPSWL,NSW,IPANEL,LPANEL,       VS  1440
     1ZS,L,IK,IPN)                                                      VS  1441
C     TO DEFINE SURFACE PANELS FOR LIFTING SURFACES                     VS  1442
      DIMENSION XXL(1),YL(1),XXT(1),CPCWL(1),CPSWL(1)                   VS  1443
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  1444
     1XLL(41)                                                           VS  1445
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  1446
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  1447
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  1448
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  1449
     1NFP(6),NW(6,2)                                                    VS  1450
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS  1451
     15),DIST,P,BK,RL,CFF                                               VS  1452
      PI=3.14159265                                                     VS  1453
      NSW1=NSW-1                                                        VS  1454
      NR=B2                                                             VS  1455
      NASYM=YCON(50)                                                    VS  1456
      IF(IPN.EQ.1) GO TO 20                                             VS  1457
      DO 1 I=1,2                                                        VS  1458
      C(I)=XXT(I)-XXL(I)                                                VS  1459
      DO 1 J=1,NCW                                                      VS  1460
    1 XL(I,J)=XXL(I)+CPCWL(J)*C(I)/100.                                 VS  1461
      SPAN=YL(2)-YL(1)                                                  VS  1462
      DO 2 J=1,NCW                                                      VS  1463
      PSI(J)=0.5*(1.-COS(FLOAT(J)*PI/FLOAT(NCW)))                       VS  1464
      SLOPE(J)=(XL(2,J)-XL(1,J))/SPAN                                   VS  1465
    2 CONTINUE                                                          VS  1466
      SPN=(XXT(2)-XXT(1))/SPAN                                          VS  1467
      DO 3 K=1,NSW                                                      VS  1468
      YK=CPSWL(K)*SPAN/100.                                             VS  1469
      IF(NW(IK,2).EQ.0) GO TO 10                                        VS  1470
      IF(L.EQ.1) GO TO 12                                               VS  1471
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10 KK=NR+K                                                                VS  1472
   YTG(KK)=YL(1)+YK                                                       VS  1473
   XTG(KK)=XXT(1)+SPN*(YTG(KK)-YL(1))                                     VS  1474
   ZTG(KK)=ZS                                                             VS  1475
12 CONTINUE                                                               VS  1476
   DO 3 J=1,NCW                                                           VS  1477
   Y(J,K)=YK+YL(1)                                                        VS  1478
   X(J,K)=XL(1,J)+SLOPE(J)*(Y(J,K)-YL(1))                                 VS  1479
 3 CONTINUE                                                               VS  1480
   XLL(1)=XXL(1)                                                          VS  1481
   XTT(1)=XXT(1)                                                          VS  1482
   IF(NASYM.EQ.0) GO TO 16                                                VS  1483
   XLL(1)=XXL(1)+(XXL(2)-XXL(1))*CPSWL(1)/100.                            VS  1484
   XTT(1)=XXT(1)+(XXT(2)-XXT(1))*CPSWL(1)/100.                            VS  1485
16 CONTINUE                                                               VS  1486
   DO 15 I=2,NSW                                                          VS  1487
   XLL(I)=XLL(I-1)+(XXL(2)-XXL(1))*(Y(1,I)-Y(1,I-1))/SPAN                 VS  1488
15 XTT(I)=XTT(I-1)+(XXT(2)-XXT(1))*(Y(1,I)-Y(1,I-1))/SPAN                 VS  1489
   GO TO 25                                                               VS  1490
20 DO 30 J=1,NCW                                                          VS  1491
   FJ=J                                                                   VS  1492
30 PSI(J)=0.5*(1.-COS(FJ*PI/FLOAT(NCW)))                                  VS  1493
   SPAN=YL(2)-YL(1)                                                       VS  1494
   DO 35 K=1,NSW                                                          VS  1495
   YK=CPSWL(K)*SPAN/100.                                                  VS  1496
   YC=YK                                                                  VS  1497
   IF(NW(IK,2).EQ.0) GO TO 31                                             VS  1498
   IF(L.EQ.1) GO TO 32                                                    VS  1499
31 KK=NR+K                                                                VS  1500
   YTG(KK)=YL(1)+YK                                                       VS  1501
   ST=SHAPTE(YC)                                                          VS  1502
   XTG(KK)=XXT(1)+ST                                                      VS  1503
   ZTG(KK)=ZS                                                             VS  1504
32 CONTINUE                                                               VS  1505
   XLL(K)=SHAPLE(YC)+XXL(1)                                               VS  1506
   ST=SHAPTE(YC)                                                          VS  1507
   XTT(K)=ST+XXT(1)                                                       VS  1508
   CHORD=XTT(K)-XLL(K)                                                    VS  1509
   DO 35 J=1,NCW                                                          VS  1510
   Y(J,K)=YC+YL(1)                                                        VS  1511
   X(J,K)=XLL(K)+CPCWL(J)*CHORD/100.                                      VS  1512
35 CONTINUE                                                               VS  1513
25 CONTINUE                                                               VS  1514
   DO 6 K=1,NSW1                                                          VS  1515
   KK=NCS+K                                                               VS  1516
   YLE(KK)=YCON(K)*SPAN+YL(1)                                             VS  1517
   XLE(KK)=XLL(K)+(XLL(K+1)-XLL(K))*(YLE(KK)-Y(1,K))/(Y(1,K+1)-Y(1,K))    VS  1518
  1)                                                                      VS  1519
   XTE(KK)=XTT(K)+(XTT(K+1)-XTT(K))*(YLE(KK)-Y(1,K))/(Y(1,K+1)-Y(1,K))    VS  1520
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     1)                                                                    VS  1521
       CH(KK)=XTE(KK)-XLE(KK)                                              VS  1522
       IF(IPN.EQ.1) GO TO 40                                               VS  1523
       SWEEP(KK)=ATAN((XXL(2)-XXL(1))/SPAN)                                VS  1524
       GO TO 45                                                            VS  1525
    40 SLP=(XLL(K+1)-XLL(K))/(Y(1,K+1)-Y(1,K))                             VS  1526
       SWEEP(KK)=ATAN(SLP)                                                 VS  1527
    45 CONTINUE                                                            VS  1528
       DO 6 J=1,NCW                                                        VS  1529
       NPANEL=(K-1)*NCW +J-1+IPANEL                                        VS  1530
       DO 5 I=1,2                                                          VS  1531
       KI1=K+I-1                                                           VS  1532
     4 XN(NPANEL,I)=X(J,KI1)                                               VS  1533
       YN(NPANEL,I)=Y(J,KI1)                                               VS  1534
       ZN(NPANEL,I)=ZS                                                     VS  1535
     5 CONTINUE                                                            VS  1536
       XCP(NPANEL)=XLE(KK)+PSI(J)*CH(KK)                                   VS  1537
       YCP(NPANEL)=YLE(KK)                                                 VS  1538
       ZCP(NPANEL)=ZS                                                      VS  1539
       XV(NPANEL)=XLE(KK)+CPCWL(J)*CH(KK)/100.                             VS  1540
       YV(NPANEL)=YLE(KK)                                                  VS  1541
     6 CONTINUE                                                            VS  1542
       LPANEL=NPANEL                                                       VS  1543
       RETURN                                                              VS  1544
       END                                                                 VS  1545
C       FORTRAN NLSTIN                                                     VS  1546
       SUBROUTINE SPLINE(N,X,Y,A,B,C,D)                                    VS  1547
C      CUBIC SPLINE INTERPOLATION                                          VS  1548
       DIMENSION S(125),H(22),CA(22),X(1),Y(1)                             VS  1549
       DIMENSION A(1),B(1),C(1),D(1)                                       VS  1550
       I=1                                                                 VS  1551
       NI=N+1                                                              VS  1552
       N1=N-1                                                              VS  1553
       H(NI)=0.                                                            VS  1554
       H(1)=X(3)-X(2)                                                      VS  1555
       H(2)=-X(3)+X(1)                                                     VS  1556
       H(3)=X(2)-X(1)                                                      VS  1557
       DO 1 K=4,N                                                          VS  1558
     1 H(K)=0.                                                             VS  1559
       DO 5 K=1,N                                                          VS  1560
     5 S(K)=-H(K+1)/H(1)                                                   VS  1561
       NJ=N-1                                                              VS  1562
       DO 10 I=2,N                                                         VS  1563
       IF (I .EQ. N) GO TO 12                                              VS  1564
       H(NI)=-6.*((Y(I+1)-Y(I))/(X(I+1)-X(I))-(Y(I)-Y(I-1))/(X(I)-X(I-1)))VS  1565
      1)                                                                   VS  1566
       GO TO 14                                                            VS  1567
    12 H(NI)=0.                                                            VS  1568
    14 DO 15 J=1.N                                                         VS  1569
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      H(J)=0.                                                                  VS  1570
      IF (I .EQ. N) GO TO 20                                                   VS  1571
      IF (J .LT. (I-1) .OR. J .GT. (I+1)) GO TO 15                             VS  1572
      H(I-1)=X(I)-X(I-1)                                                       VS  1573
      H(I)=2.*(X(I+1)-X(I-1))                                                  VS  1574
      H(I+1)=X(I+1)-X(I)                                                       VS  1575
      GO TO 15                                                                 VS  1576
   20 H(N-2)=X(N)-X(N-1)                                                       VS  1577
      H(N-1)=-X(N)+X(N-2)                                                      VS  1578
      H(N)=X(N-1)-X(N-2)                                                       VS  1579
   15 CONTINUE                                                                 VS  1580
      II=I                                                                     VS  1581
      CALL VMSEON(NJ,II,H,S,CA)                                                VS  1582
      NJ=NJ-1                                                                  VS  1583
   10 CONTINUE                                                                 VS  1584
      DO 25 I=1,N1                                                             VS  1585
      A(I)=(S(I+1)-S(I))/(6.*(X(I+1)-X(I)))                                    VS  1586
      B(I)=S(I)/2.                                                             VS  1587
      C(I)=(Y(I+1)-Y(I))/(X(I+1)-X(I))-(X(I+1)-X(I))*(2.*S(I)+S(I+1))/         VS  1588
     16.                                                                       VS  1589
   25 D(I)=Y(I)                                                                VS  1590
      RETURN                                                                   VS  1591
      END                                                                      VS  1592
C      FORTRAN NLSTIN                                                          VS  1593
      FUNCTION SHAPLE(Y)                                                       VS  1594
C     TO DEFINE CURVED LEADING EDGES                                           VS  1595
      COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)                VS  1596
      K=1                                                                      VS  1597
    1 IF(Y.GE.YSL(K).AND.Y.LT.YSL(K+1)) GO TO 2                                VS  1598
      K=K+1                                                                    VS  1599
      IF(K.GE.NLE) GO TO 3                                                     VS  1600
      GO TO 1                                                                  VS  1601
    2 SM=Y-YSL(K)                                                              VS  1602
      SHAPLE=AQL(K)*SM**3+BQL(K)*SM*SM+CQL(K)*SM+DQL(K)                        VS  1603
      GO TO 5                                                                  VS  1604
    3 IF(Y.LT.YSL(1)) GO TO 4                                                  VS  1605
      K=NLE-1                                                                  VS  1606
      GO TO 2                                                                  VS  1607
    4 K=1                                                                      VS  1608
      GO TO 2                                                                  VS  1609
    5 RETURN                                                                   VS  1610
      END                                                                      VS  1611
C      FORTRAN NLSTIN                                                          VS  1612
      FUNCTION SHAPTE(Y)                                                       VS  1613
C     TO DEFINE CURVED TRAILING EDGES                                          VS  1614
      COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)                VS  1615
      K=1                                                                      VS  1616
    1 IF(Y.GE.YST(K).AND.Y.LT.YST(K+1)) GO TO 2                                VS  1617
      K=K+1                                                                    VS  1618
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      IF(K.GE.NTE) GO TO 3                                                    VS  1619
      GO TO 1                                                                 VS  1620
    2 SM=Y-YST(K)                                                             VS  1621
      SHAPTE=AQT(K)*SM**3+BQT(K)*SM*SM+CQT(K)*SM+DQT(K)                       VS  1622
      GO TO 5                                                                 VS  1623
    3 IF(Y.LT.YST(1)) GO TO 4                                                 VS  1624
      K=NTE-1                                                                 VS  1625
      GO TO 2                                                                 VS  1626
    4 K=1                                                                     VS  1627
      GO TO 2                                                                 VS  1628
    5 RETURN                                                                  VS  1629
      END                                                                     VS  1630
C      LINK    LINK22,LINK11                                                  VS  1631
C      FORTRAN NLSTIN                                                         VS  1632
      SUBROUTINE DWASH                                                        VS  1633
C     TO SET UP DOWNWASH COEFF. MATRIX AND OBTAIN SOLUTION                    VS  1634
C     * IP SHOULD BE CONSISTENT WITH THE DESIRED MATRIX SIZE WITH A            VS  1635
C     MAXIMUM EQUAL TO 200. THE DIMENSION FOR GAMMA SHOULD BE IP*IP.          VS  1636
      DIMENSION GAMMA(38025)                                                  VS  1637
      DIMENSION GAM(200)                                                      VS  1638
C     PARAMETER IP=195                                                        VS  1639
      DIMENSION DQ(195,195)                                                   VS  1640
      EQUIVALENCE (DQ(1,1),GAMMA(1))                                          VS  1641
      COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(200),LAT,CREF,BREF2               VS  1642
      DIMENSION DMM(200),AW(201),CA(200),BW(200)                              VS  1643
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  1644
     1XLL(41)                                                                 VS  1645
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  1646
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  1647
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  1648
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                          VS  1649
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),        VS  1650
     1NFP(6),NW(6,2)                                                          VS  1651
      COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10,VS  1652
     120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)            VS  1653
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,VS  1654
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)                  VS  1655
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS  1656
     15),DIST,P,BK,RL,CFF                                                     VS  1657
      COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS  1658
     1,4),YLF(6,10,4),SLP1(6,10)                                              VS  1659
      COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,VS  1660
     120)                                                                     VS  1661
      COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)               VS  1662
      COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)               VS  1663
      COMMON/LOOP/KP,NALP,KALP,TANC2,CLDS,AL,CLII,ALPII,ALPA(15)              VS  1664
      COMMON /AJG/ ALP,J1,CP(200),GAMP(200),GAMR(200),GAMR(200)               VS  1665
     1,GAMX(200),ZZCP(200),DZY(200),BMR(6,50),BML(6,50),CSU(50)               VS  1666
      COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IAGVX,PT                      VS  1667
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     1,NAUG,IBD,PBK,PIS,IDIH,ALPINC,IRL,KT,PI,ALQ,ALZ                    VS  1668
     2,NC1,NC2,IBLC                                                     VS  1669
      COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),NAL(6)           VS  1670
     1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6) VS  1671
     1,ICAMT(6)                                                         VS  1672
      COMMON/GDSL/ DF(6,5),YCN(6,4),NLEF(6),NVRTX(6),SNALP(50),CNALP(50)VS  1673
     1,ALPH(50),AUX(6,5),CRX(6,5),XTILT(6),SLETH(6),YCNTD(6)           VS  1674
     1,NVL1(6),NVL2(6),XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF       VS  1675
     1,BUX(6,5),SE(3,6,15),NUR(6),CVR(50),CPAUG(200)                   VS  1676
     1,ALPBD(6,2),MX(6),ALBDBR(6,2),ALBDBL(6,2),NVPTX(6)               VS  1677
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS  1678
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,XU   VS  1679
      COMMON /INOUT/ INPT,JPT                                           VS  1680
    2 FORMAT (8F10.6)                                                   VS  1681
    3 FORMAT (8(6X,I4))                                                 VS  1682
    7 FORMAT (11F10.5)                                                  VS  1683
      IP = 195                                                          VS  1684
      NPP=NALP                                                          VS  1685
      SS=SIN(ALP)                                                       VS  1686
      CS=COS(ALP)                                                       VS  1687
      IF(IALP.EQ.1) SS=1.                                               VS  1688
      IF(IALP.EQ.1) CS=1.                                               VS  1689
      IF(IALP.EQ.1) GO TO 1001                                          VS  1690
      K=1                                                               VS  1691
      KM=1                                                              VS  1692
      DO 1005 I=1,NCS                                                   VS  1693
      IF (ITWST(K).EQ.1) GO TO 1009                                     VS  1694
      ALPH(I)=ALP+RINC(K)                                               VS  1695
      IF(IWING(K).NE.0 .AND. I.GT.IWING(K)) GO TO 1006                  VS  1696
      SNALP(I)=SIN(ALPH(I))                                             VS  1697
      CNALP(I)=COS(ALPH(I))                                             VS  1698
      GO TO 1010                                                        VS  1699
 1009 YC=YLE(KM)/HALFB(K)                                               VS  1700
      IF(IWING(K).NE.0.AND.I.GT.IWING(K)) GO TO 1006                    VS  1701
      CALL TWIST (YC,ATW,K)                                             VS  1702
      ALPH(I)=ALP+RINC(K)+ATW                                           VS  1703
      SNALP(I)=SIN(ALPH(I))                                             VS  1704
      CNALP(I)=COS(ALPH(I))                                             VS  1705
      GO TO 1010                                                        VS  1706
 1006 ALPH(I)=TINP(K)+ALP                                               VS  1707
      SNALP(I)=SIN(ALPH(I))                                             VS  1708
      CNALP(I)=COS(ALPH(I))                                             VS  1709
 1010 KM=KM+1                                                           VS  1710
      IF(I.NE.NS(K)) GO TO 1005                                         VS  1711
      IF(NW(K,2).EQ.0) GO TO 1005                                       VS  1712
      IF(K.EQ.1) KM=KM+NS(K)                                            VS  1713
      IF(K.GT.1) KM=KM+NS(K)-NS(K-1)                                    VS  1714
 1005 IF(I.EQ.NS(K)) K=K+1                                              VS  1715
 1001 CONTINUE                                                          VS  1716
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C       SETTING-UP OF BOUNDARY CONDITIONS                                    VS  1717
      NF2=2*NF                                                               VS  1718
      F0=0.                                                                  VS  1719
      F10=0.                                                                 VS  1720
      GB0=0.                                                                 VS  1721
      IF (KF .EQ. 0) GO TO 99                                                VS  1722
      F0=4.*PI*CS*RDX                                                        VS  1723
      F10=-8.*PI*SS*RDX                                                      VS  1724
      CALL FALONE(8,CS,AW,CA,GAMMA)                                          VS  1725
C     WRITE(JPT,2) (WARD(I),I=1,NF)                                          VS  1726
      IF(KP.GT.1) GO TO 99                                                   VS  1727
C                                                                            VS  1728
C  *  COMPUTE THE INFLUENCE COEFFICIENTS DUE TO THE PRESENCE OF THE          VS  1729
C     FUSELAGE, AND STORE ON FILE (02) *                                     VS  1730
C                                                                            VS  1731
      CALL VELFUS(LPANEL,AW,BW,AM,LPAN1,IWING,NC1,DCOS,DSIN,NASYM,YBREAKVS  1732
     1,LPN,NS,IWGLT,NC,BREAK)                                                VS  1733
      REWIND 02                                                              VS  1734
      REWIND 04                                                              VS  1735
      READ (03) (CP(I),I=1,LPANEL)                                           VS  1736
   99 CONTINUE                                                               VS  1737
      IF(KP.EQ.1)  REWIND 01                                                 VS  1738
      MM=NW(1,1)                                                             VS  1739
      J1=LWF+1                                                               VS  1740
      IZ=1                                                                   VS  1741
      IPN=1                                                                  VS  1742
      IF(NW(1,2).EQ.0) GO TO 12                                              VS  1743
      II=1+NS(1)                                                             VS  1744
      CHORD=CH(1)+CH(II)                                                     VS  1745
      GO TO 13                                                               VS  1746
   12 CHORD=CH(1)                                                            VS  1747
   13 CONTINUE                                                               VS  1748
      CSD=DCOS(1,1)                                                          VS  1749
      SSD=DSIN(1,1)                                                          VS  1750
      ZB=0.                                                                  VS  1751
      YB=BREAK(1,1)                                                          VS  1752
      YBB=BREAK(1,1)                                                         VS  1753
      NC1=0                                                                  VS  1754
      NC2=0                                                                  VS  1755
      IF(NASYM.EQ.0) GO TO 1370                                              VS  1756
      K2 = NC(1)                                                             VS  1757
      DO 1371 I=1,K2                                                         VS  1758
      IF(ABS(BREAK(1,I)).GT.0.001) GO TO 1371                                VS  1759
      NC1=I-1                                                                VS  1760
 1371 CONTINUE                                                               VS  1761
      YB=YBREAK(1,NC1)                                                       VS  1762
      YBB=YB                                                                 VS  1763
      NC2=NC(1)-NC1                                                          VS  1764
      IF(NC1.EQ.1) GO TO 1370                                                VS  1765
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      NC11=NC1-1                                                        VS  1766
      DO 1372 I=1,NC11                                                  VS  1767
      ZB=ZB+(YBREAK(1,I)-YBREAK(1,I+1))*DSIN(1,I+1)                     VS  1768
 1372 YBB=YBB+(YBREAK(1,I)-YBREAK(1,I+1))*DCOS(1,I+1)                   VS  1769
      YB=YBREAK(1,1)                                                    VS  1770
 1370 CONTINUE                                                          VS  1771
      YBP=YB                                                            VS  1772
      YBBP=YBB                                                          VS  1773
      IF(KP.NE.1) GO TO 181                                             VS  1774
      CALL WING(AW,BW,LPANEL,1,0,LPAN1,LAT,CSD,SSD,YBREAK,              VS  1775
     1DCOS,DSIN,IWING,ZB,YB,YBB,IWGLT,IV,NC1,ZZCP,KF,BREAK)             VS  1776
  181 CONTINUE                                                          VS  1777
      XC=(XCP(1)-XLE(IZ))/CHORD                                         VS  1778
      IF(ICAM(1).EQ.3) XC=XCP(1)                                        VS  1779
      IF(IALP.EQ.1) GO TO 1301                                          VS  1780
      IF(ICAMB.EQ.1) GO TO 1300                                         VS  1781
      YK1=(YCP(1)-YN(1,1))/(YN(1,2)-YN(1,1))                            VS  1782
      XK1=XN(1,1)+(XN(1,2)-XN(1,1))*YK1                                 VS  1783
      X1=(XK1-XLE(IZ))/CHORD                                            VS  1784
      TSW=(XN(1,2)-XN(1,1))/(YN(1,2)-YN(1,1))                           VS  1785
      CALL ZCR(XC,YCP(1),CAM,ICAM,X1,1,1,CHORD,DZDY,IST,TSW)            VS  1786
      DZY(1)=DZDY                                                       VS  1787
      GO TO 1301                                                        VS  1788
 1300 YC=YLE(IZ)                                                        VS  1789
      XC=XCP(1)                                                         VS  1790
      CALL ZCDX(XC,YC,CAM,DZDY)                                         VS  1791
      DZY(1)=DZDY                                                       VS  1792
 1301 CONTINUE                                                          VS  1793
      IF (IALP .EQ. 1) ALPT=1.                                          VS  1794
      IF (IALP.NE.1) ALPT=SNALP(IZ)                                     VS  1795
      K=1                                                               VS  1796
      IJ=1                                                              VS  1797
      JZ=2                                                              VS  1798
      NZ=1                                                              VS  1799
      IF (NLEF(K).EQ.1) JZ=1                                            VS  1800
      IF (NLEF(K).EQ.1) NZ=2                                            VS  1801
      IF (NLEF(K).EQ.0)  GO TO 1231                                     VS  1802
      IF(IJ.GE.MJW1(1,JZ,1).AND.IJ.LE.MJW2(1,JZ,1)) CAM=CAM+TFLP(1,1)   VS  1803
 1231 CONTINUE                                                          VS  1804
      IF (IALP .EQ. 1) CAM=0.                                           VS  1805
      AW(J1)=ALPT*CSD-CAM*CNALP(IZ)                                     VS  1806
      BW(J1)=0.                                                         VS  1807
      WN=0.                                                             VS  1808
      IF (KF .EQ. 0) GO TO 1041                                         VS  1809
      IF(KP.GT.1) GO TO 50                                              VS  1810
      READ (02) (DMM(LK),LK=1,NTL)                                      VS  1811
      READ (04) (GAM(LK),LK=1,NTL)                                      VS  1812
      DO 1043 LK=1,NTL                                                  VS  1813
      KK=LPANEL+LK                                                      VS  1814
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      BW(KK)=GAM(LK)                                                    VS  1815
      AW(KK)=DMM(LK)                                                    VS  1816
 1043 CONTINUE                                                          VS  1817
   50 XO=XCP(1)                                                         VS  1818
      YO=YBB+(YCP(1)-YB)*CSD                                            VS  1819
      ZO=ZCP(1)+ZB+(YCP(1)-YB)*SSD                                      VS  1820
      WK=0.                                                             VS  1821
      CALL FUSVOL (B,XO,YO,ZO,WN,WK,GBO,0,0,CSD,SSD)                    VS  1822
      AW(J1)=AW(J1)+WN                                                  VS  1823
      IF(KP.GT.1) GO TO 1041                                            VS  1824
      DO 141 KK=1,LPANEL                                                VS  1825
  141 AW(KK)=AW(KK)+WK*WKN*CP(KK)                                       VS  1826
 1041 CONTINUE                                                          VS  1827
      IF(NALP.GT.1) CA(1)=AW(J1)                                        VS  1828
      GAMB(1)=ALPT*CSD+WN                                               VS  1829
C     WRITE(JPT,2) XC,YCP(1),CAM                                        VS  1830
      IF(NALP.GT.1) GO TO 182                                           VS  1831
      IF(NAUG.EQ.1) CA(1)=AW(J1)                                        VS  1832
      IF(NAUG.EQ.1) GO TO 182                                           VS  1833
      DO 200 I=1,LWF                                                    VS  1834
  200 GAMMA(I)=-AW(I+1)/AW(1)                                           VS  1835
  182 CONTINUE                                                          VS  1836
      IF(KP.GT.1) GO TO 51                                              VS  1837
      WRITE (01) (AW(JJ),JJ=1,LWF)                                      VS  1838
      WRITE (01) (BW(JJ),JJ=1,LWF)                                      VS  1839
   51 CONTINUE                                                          VS  1840
      IJ=2                                                              VS  1841
      NJ=LWF-1                                                          VS  1842
      LL=1                                                              VS  1843
      IY=1                                                              VS  1844
      KCH=1                                                             VS  1845
      ISTP=1                                                            VS  1846
  205 CONTINUE                                                          VS  1847
      KCH=IZ                                                            VS  1848
      CSD=DCOS(K,IPN)                                                   VS  1849
      SSD=DSIN(K,IPN)                                                   VS  1850
      NN=NW(K,1)                                                        VS  1851
      JZ=2                                                              VS  1852
      NZ=1                                                              VS  1853
      IF(NLEF(K).EQ.1) JZ=1                                             VS  1854
      IF(NLEF(K).EQ.1) NZ=2                                             VS  1855
      IF(KP.NE.1) GO TO 183                                             VS  1856
      CALL WING(AW,BW,LPANEL,IJ,B,LPAN1,LAT,CSD,SSD,YBREAK,             VS  1857
     1DCOS,DSIN,IWING,ZB,YB,YBB,IWGLT,IV,NC1,ZZCP,KF,BREAK)             VS  1858
  183 CONTINUE                                                          VS  1859
      IF(NW(K,2).EQ.0) GO TO 14                                         VS  1860
      IF(K.EQ.1) II=KCH+NS(K)                                           VS  1861
      IF(K.GT.1) II=KCH+NS(K)-NS(K-1)                                   VS  1862
      CHORD=CH(KCH)+CH(II)                                              VS  1863
```

```
      GO TO 16                                                          VS  1864
   14 CHORD=CH(KCH)                                                     VS  1865
   16 CONTINUE                                                          VS  1866
      XC=(XCP(IJ)-XLE(IZ))/CHORD                                        VS  1867
      IF(ICAM(K).EQ.3) XC=XCP(IJ)                                       VS  1868
      IF(ISTP.GT.IWING(K).AND.IWING(K).NE.0) GO TO 1013                 VS  1869
      LCAM=0                                                            VS  1870
      IF (IALP .EQ. 1) GO TO 1025                                       VS  1871
      IF(ICAM(K).EQ.2) GO TO 1305                                       VS  1872
      NP=IJ                                                             VS  1873
 1015 YK1=(YCP(NP)-YN(NP,1))/(YN(NP,2)-YN(NP,1))                        VS  1874
      XK1=XN(NP,1)+(XN(NP,2)-XN(NP,1))*YK1                              VS  1875
      X1=(XK1-XLE(IZ))/CHORD                                            VS  1876
      TSW=(XN(NP,2)-XN(NP,1))/(YN(NP,2)-YN(NP,1))                       VS  1877
      CALL ZCR(XC,YCP(NP),CAM1,ICAM,X1,K,1,CHORD,DZDY,IST,TSW)          VS  1878
      IF(LCAM.EQ.0) DZY(IJ)=DZDY                                        VS  1879
      IF (LCAM .EQ. 1) GO TO 1035                                       VS  1880
      CAM=CAM1                                                          VS  1881
      GO TO 1020                                                        VS  1882
 1025 CAM=0.                                                            VS  1883
      GO TO 19                                                          VS  1884
 1305 YC=YLE(IZ)                                                        VS  1885
      XC=XCP(IJ)                                                        VS  1886
      CALL ZCDX(XC,YC,CAM,DZDY)                                         VS  1887
      DZY(IJ)=DZDY                                                      VS  1888
 1020 CONTINUE                                                          VS  1889
      IF(IJ.GE.MJW1(K,JZ,LL).AND.IJ.LE.MJW2(K,JZ,LL)) GO TO 18          VS  1890
      GO TO 17                                                          VS  1891
   18 IF(LL.EQ.NAL(K)) GO TO 19                                         VS  1892
      CAM1=TFLP(K,LL)+CAM                                               VS  1893
      IF (NLEF(K).EQ.1.AND.IJ.EQ.MM) CAM1=0.5*TFLP(K,LL)+CAM            VS  1894
      CAM=CAM1                                                          VS  1895
      GO TO 19                                                          VS  1896
   17 IF(NW(K,2).EQ.0) GO TO 19                                         VS  1897
      IF(NC(K).GT.1) GO TO 22                                           VS  1898
      IF(IJ.EQ.MM.AND.NLEF(K).EQ.0) CAM=CAM+0.5*TFLP(K,LL)              VS  1899
      GO TO 19                                                          VS  1900
   22 CONTINUE                                                          VS  1901
      IF(IJ.GT.LPAN1(K).AND.IJ.LE.LPN(K)) GO TO 19                      VS  1902
      IF(IJ.NE.MM) GO TO 19                                             VS  1903
      KH=1                                                              VS  1904
      IF(K.GT.1) KH=NS(K-1)+1                                           VS  1905
      NCM=IJ+(NS(K)-ISTP)*NW(K,1)+(ISTP-KH)*NW(K,2)+1                   VS  1906
C     WRITE(JPT,3) IJ,NCM,IZ                                            VS  1907
      XC=(XCP(NCM)-XLE(IZ))/CHORD                                       VS  1908
      IF(ICAM(K).EQ.3) XC=XCP(NCM)                                      VS  1909
      IF(ICAM(K).EQ.2) GO TO 1310                                       VS  1910
      NP=NCM                                                            VS  1911
      LCAM=1                                                            VS  1912
```

```
      GO TO 1015                                                        VS  1913
1310  XC=XCP(NCM)                                                       VS  1914
      YC=YLE(IZ)                                                        VS  1915
      CALL ZCDX(XC,YC,CAM1,DZDY)                                        VS  1916
1035  CONTINUE                                                          VS  1917
      CAM=0.5*(CAM+CAM1)                                                VS  1918
      IF(IJ.GE.MJW1(K,NZ,LL).AND.IJ.LE.MJW2(K,NZ,LL)) GO TO 23          VS  1919
      GO TO 19                                                          VS  1920
   23 IF (LL.EQ.NAL(K)) GO TO 19                                        VS  1921
      IF(IJ.EQ.MM.AND.NLEF(K).EQ.0) CAM=CAM+0.5*TFLP(K,LL)              VS  1922
   19 CONTINUE                                                          VS  1923
      IF(IALP.NE.1) ALPT=SNALP(ISTP)                                    VS  1924
      IF (IALP .EQ. 1) ALPT=1.                                          VS  1925
      GO TO 1014                                                        VS  1926
1013  ALPT=SNALP(ISTP)                                                  VS  1927
      IF(IALP.EQ.1) ALPT=1.                                             VS  1928
      CAM=0.                                                            VS  1929
      IF(IALP.EQ.1) GO TO 1014                                          VS  1930
      IF(ICAMT(K).EQ.0) GO TO 1331                                      VS  1931
      NP=IJ                                                             VS  1932
      NCAM=0                                                            VS  1933
1016  YK1=(YCP(NP)-YN(NP,1))/(YN(NP,2)-YN(NP,1))                        VS  1934
      XK1=XN(NP,1)+(XN(NP,2)-XN(NP,1))*YK1                              VS  1935
      X1=(XK1-XLE(IZ))/CHORD                                            VS  1936
      ICT=ICAMT(K)                                                      VS  1937
      TSW=(XN(NP,2)-XN(NP,1))/(YN(NP,2)-YN(NP,1))                       VS  1938
      CALL ZCR(XC,YCP(NP),ZR,ICAM,X1,K,ICT,CHORD,DZDY,IST,TSW)          VS  1939
      IF(NCAM.EQ.0) DZY(IJ)=DZDY                                        VS  1940
      IF(NCAM.EQ.1) GO TO 1017                                          VS  1941
      CAM=ZR                                                            VS  1942
      IF(NW(K,2).EQ.0) GO TO 1331                                       VS  1943
      IF(IJ.GT.LPAN1(K)) GO TO 1331                                     VS  1944
      IF(IJ.NE.MM) GO TO 1331                                           VS  1945
      KH=1                                                              VS  1946
      IF(K.GT.1) KH=NS(K-1)+1                                           VS  1947
      NCM=IJ+(NS(K)-ISTP)*NW(K,1)+(ISTP-KH)*NW(K,2)+1                   VS  1948
      XC=(XCP(NCM)-XLE(IZ))/CHORD                                       VS  1949
      IF(ICAM(K).EQ.3) XC=XCP(NCM)                                      VS  1950
      NP=NCM                                                            VS  1951
      NCAM=1                                                            VS  1952
      GO TO 1016                                                        VS  1953
1017  CAM1=ZR                                                           VS  1954
      CAM=0.5*(CAM+CAM1)                                                VS  1955
1331  CONTINUE                                                          VS  1956
      IF(NLEF(K).EQ.1) GO TO 1018                                       VS  1957
      IF(IJ.GE.MJW1(K,JZ,LL).AND.IJ.LE.MJW2(K,JZ,LL)) GO TO 40          VS  1958
      IF(IJ.GE.MJW1(K,NZ,LL).AND.IJ.LE.MJW2(K,NZ,LL)) GO TO 41          VS  1959
      GO TO 1014                                                        VS  1960
   41 CONTINUE                                                          VS  1961
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```
      IF(IJ.EQ.MM) CAM=CAM+0.5*TFLP(K,LL)                                VS  1962
      GO TO 1014                                                         VS  1963
   40 CONTINUE                                                           VS  1964
      IF(IJ.GT.LPAN1(K)) CAM=CAM+TFLP(K,LL)                              VS  1965
      GO TO 1014                                                         VS  1966
 1018 IF(IJ.GT.LPAN1(K)) GO TO 1014                                      VS  1967
      IF(IJ.EQ.MM) CAM=CAM+0.5*TFLP(K,LL)                                VS  1968
 1014 CONTINUE                                                           VS  1969
C       BOUNDARY  CONDITION                                             VS  1970
      AW(J1)=ALPT*CSD-CAM*CNALP(ISTP)                                    VS  1971
      GAMB(IJ)=ALPT*CSD                                                  VS  1972
      BW(J1)=0.                                                          VS  1973
      WN=0.                                                              VS  1974
      IF (KF .EQ. 0) GO TO 1042                                          VS  1975
      IF(KP.GT.1) GO TO 52                                               VS  1976
      READ (02) (DMM(LK),LK=1,NTL)                                       VS  1977
      READ (04) (GAM(LK),LK=1,NTL)                                       VS  1978
      DO 1044 LK=1,NTL                                                   VS  1979
      KK=LPANEL+LK                                                       VS  1980
      BW(KK)=GAM(LK)                                                     VS  1981
 1044 AW(KK)=DMM(LK)                                                     VS  1982
   52 CONTINUE                                                           VS  1983
      XO=XCP(IJ)                                                         VS  1984
      YO=YBB+(YCP(IJ)-YB)*CSD                                            VS  1985
      ZO=ZCP(IJ)+ZB+(YCP(IJ)-YB)*SSD                                     VS  1986
      WK=0.                                                              VS  1987
      CALL FUSVOL(B,XO,YO,ZO,WN,WK,GBO,0,0,CSD,SSD)                      VS  1988
      AW(J1)=AW(J1)+WN                                                   VS  1989
      GAMB(IJ)=GAMB(IJ)+WN                                               VS  1990
      IF(KP.GT.1) GO TO 1042                                             VS  1991
      DO 142 KK=1,LPANEL                                                 VS  1992
  142 AW(KK)=AW(KK)+WK*WKN*CP(KK)                                        VS  1993
 1042 CONTINUE                                                           VS  1994
      IF(KP.GT.1) GO TO 53                                               VS  1995
      WRITE (01) (AW(JJ),JJ=1,LWF)                                       VS  1996
      WRITE (01) (BW(JJ),JJ=1,LWF)                                       VS  1997
   53 CONTINUE                                                           VS  1998
C     WRITE(JPT,2) XC,AW(J1),ALPT,CSD,CAM,CNALP(ISTP)                   VS  1999
      IF(NALP.GT.1 .OR.NAUG.EQ.1) CA(IJ)=AW(J1)                          VS  2000
      IF(NALP.GT.1) GO TO 184                                            VS  2001
      IF(NAUG.EQ.1) GO TO 184                                            VS  2002
      CALL VMSEON (NJ,IJ,AW,GAMMA,CA)                                    VS  2003
  184 CONTINUE                                                           VS  2004
      IF(IJ.GE.LPAN1(K).AND.IJ.LT.LPN(K)) GO TO 1117                     VS  2005
      IF(IJ.EQ.MJW2(K,1,LL)) LL=LL+1                                     VS  2006
      GO TO 1118                                                         VS  2007
 1117 NN=NW(K,2)                                                         VS  2008
      IF(IJ.EQ.MJW2(K,2,LL)) LL=LL+1                                     VS  2009
 1118 CONTINUE                                                           VS  2010
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```
      IF(IJ.EQ.LPN(K).AND.IJ.LT.LPANEL) NN=NW(K+1,1)                    VS  2011
      IF (IJ .LT. MM) GO TO 25                                          VS  2012
      IF(NW(K,2).EQ.0) GO TO 1220                                       VS  2013
      IF(IJ.LE.LPAN1(K)) GO TO 1221                                     VS  2014
 1220 IZ0=I7+1                                                          VS  2015
      XLL(IY)=SSD                                                       VS  2016
      XTT(IY)=CSD                                                       VS  2017
      IY=IY+1                                                           VS  2018
 1221 CONTINUE                                                          VS  2019
      IZ=IZ+1                                                           VS  2020
      MM=MM+NN                                                          VS  2021
      KCH=KCH+1                                                         VS  2022
      ISTP=ISTP+1                                                       VS  2023
      IF(IWING(K).NE.0.AND.ISTP.EQ.(IWING(K)+1)) GO TO 1113             VS  2024
      IF(IJ.EQ.LPAN1(K).OR.IJ.EQ.LPN(K)) GO TO 1113                     VS  2025
      IF(ISTP.EQ.(NS(K)+1)) GO TO 1116                                  VS  2026
      IF(YLE(IZ).LT.YBREAK(K,IPN)) GO TO 25                             VS  2027
 1113 CONTINUE                                                          VS  2028
      NI=0                                                              VS  2029
      IF(NASYM.EQ.1 .AND. IPN.LT.NC1) NI=1                              VS  2030
      IF(NI.EQ.1) IPN=IPN+1                                             VS  2031
      ZB=ZB+(YBREAK(K,IPN)-YB)*DSIN(K,IPN)                              VS  2032
      YBB=YBB+(YBREAK(K,IPN)-YB)*DCOS(K,IPN)                            VS  2033
      YB=YBREAK(K,IPN)                                                  VS  2034
      IF(IWING(K).NE.0.AND.ISTP.EQ.(IWING(K)+1)) GO TO 1114             VS  2035
      IF(IJ.EQ.LPAN1(K).OR.IJ.EQ.LPN(K)) GO TO 1116                     VS  2036
      GO TO 1115                                                        VS  2037
 1114 IF(IWGLT(K).EQ.1) GO TO 1115                                      VS  2038
 1116 ZB=0.                                                             VS  2039
      YB=BREAK(K,1)                                                     VS  2040
      YBB=BREAK(K,1)                                                    VS  2041
      IF(NASYM.EQ.1.AND.IJ.EQ.LPAN1(K)) YB=YBP                          VS  2042
      IF(NASYM.EQ.1.AND.IJ.EQ.LPAN1(K)) YBB=YBBP                        VS  2043
      IF(IJ.EQ.LPN(K).AND.K.LT.6) YB=BREAK(K+1,1)                       VS  2044
      IF(IJ.EQ.LPN(K).AND.K.LT.6) YBB=BREAK(K+1,1)                      VS  2045
      IF(IJ.EQ.LPN(K)) GO TO 1115                                       VS  2046
      IF(ISTP.EQ.(NS(K)+1)) GO TO 1115                                  VS  2047
      IF(IWGLT(K).NE.2) GO TO 1115                                      VS  2048
      ZB=YBREAK(K,NC(K)-2)*DSIN(K,1)                                    VS  2049
      YBB=YBREAK(K,NC(K)-2)*DCOS(K,1)                                   VS  2050
      YB=YBREAK(K,NC(K)-2)                                              VS  2051
 1115 CONTINUE                                                          VS  2052
      IF(NI.NE.1) IPN=IPN+1                                             VS  2053
      IF(IJ.EQ.LPAN1(K).OR.IJ.EQ.LPN(K)) IPN=1                          VS  2054
   25 KH=0                                                              VS  2055
      IF(IJ.EQ.LPAN1(K).AND.IJ.NE.LPN(K)) KH=1                          VS  2056
      IF(KH.EQ.1.AND.K.EQ.1) IZ=IZ-NS(K)                                VS  2057
      IF(KH.EQ.1.AND.K.GT.1) IZ=IZ-NS(K)+NS(K-1)                        VS  2058
      IF(IJ.EQ.LPN(K).AND.NW(K,2).NE.0) KH=2                            VS  2059
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```
      IF(KH.EC.2.AND.K.EQ.1) IZ=IZ+NS(K)                                VS  2060
      IF(KH.EQ.2.AND.K.GT.1) IZ=IZ+NS(K)-NS(K-1)                        VS  2061
      IF(KH.EQ.1.AND.K.EQ.1) ISTP=ISTP-NS(K)                            VS  2062
      IF(KH.EQ.1.AND.K.GT.1) ISTP=ISTP-NS(K)+NS(K-1)                    VS  2063
      IF(IJ.EQ.LPAN1(K)) LL=1                                           VS  2064
      IJ=IJ+1                                                           VS  2065
      NJ=NJ-1                                                           VS  2066
      IF(IJ.EQ.(LPN(K)+1)) K=K+1                                        VS  2067
      IF (IJ .LE. LPANEL) GO TO 205                                     VS  2068
      IF (KF .EQ. 0) GO TO 207                                          VS  2069
      DO 206 KJ=1,NTL                                                   VS  2070
      GAMB(LPANEL+KJ)=0.                                                VS  2071
      CA(LPANEL+KJ)=0.                                                  VS  2072
      IF(KP.GT.1) GO TO 26                                              VS  2073
      READ (02) (AW(KK),KK=1,LWF)                                       VS  2074
      READ (04) (BW(KK),KK=1,LWF)                                       VS  2075
   26 CONTINUE                                                          VS  2076
      AW(J1)=0.                                                         VS  2077
      BW(J1)=0.                                                         VS  2078
      IF (KJ .GT. NF) GO TO 91                                          VS  2079
      KI=KJ                                                             VS  2080
      XS=XCF(KI)-XTEF                                                   VS  2081
      XB=XCF(KI)-XLEF                                                   VS  2082
      IF (KJ .EQ. NF) RFL=0.                                            VS  2083
      IF (KJ .NE. NF) RFL=XS/SQRT(XS*XS+B*RF(KI)*RF(KI))                VS  2084
      RF1=XS*(1.+RFL)                                                   VS  2085
      RF0=XB*(1.+XB/SQRT(XB*XB+B*RF(KI)*RF(KI)))                        VS  2086
      WK=-(RF1-RF0)*WKN/(4.*PI)                                         VS  2087
      APT=SS*RF(KI)*RF(KI)-(RF1-RF0)*F10/(4.*PI)                        VS  2088
      AW(J1)=APT                                                        VS  2089
      CA(LPANEL+KJ)=APT                                                 VS  2090
      GAMB(LPANEL+KJ)=APT                                               VS  2091
      IF(KP.GT.1) GO TO 27                                              VS  2092
      DO 143 KK=1,LPANEL                                                VS  2093
  143 AW(KK)=AW(KK)+WK*CP(KK)                                           VS  2094
   91 CONTINUE                                                          VS  2095
      WRITE (01) (AW(JJ),JJ=1,LWF)                                      VS  2096
      WRITE (01) (BW(JJ),JJ=1,LWF)                                      VS  2097
   27 CONTINUE                                                          VS  2098
C     WRITE(JPT,2) AW(J1)                                               VS  2099
      IF (NALP .GT. 1) GO TO 208                                        VS  2100
      IF (NAUG .EQ. 1) GO TO 208                                        VS  2101
      CALL VMSEON(NJ,IJ,AW,GAMMA,CA)                                    VS  2102
  208 NJ=NJ-1                                                           VS  2103
  206 IJ=IJ+1                                                           VS  2104
  207 CONTINUE                                                          VS  2105
C        END OF SETTING-UP OF BOUNDARY CONDITIONS                       VS  2106
      NSO=NCS+NSUR                                                      VS  2107
C     WRITE(JPT,7) (XTG(I),YTG(I),ZTG(I),I=1,NSO)                       VS  2108
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C       WRITE(JPT,2) (CH(I),I=1,NCS)                                    VS  2109
C       WRITE(JPT,2) (XLE(I),I=1,NCS)                                   VS  2110
C       WRITE(JPT,2) (XLL(I),XTT(I),I=1,NCS)                            VS  2111
        REWIND 02                                                       VS  2112
        DO 195 I=1,LWF                                                  VS  2113
  195 DMM(I)=GAMMA(I)                                                   VS  2114
        IF(KP.EQ.1) CALL INVN(DO,CP,AW,LAT,NPP,LWF,IP,NAUG)             VS  2115
        DO 196 I=1,LWF                                                  VS  2116
  196 GAMMA(I)=DMM(I)                                                   VS  2117
        REWIND 02                                                       VS  2118
        IF(NAUG.EQ.1) GO TO 903                                         VS  2119
        IF(NALP.EQ.1) GO TO 185                                         VS  2120
  903 CONTINUE                                                          VS  2121
        DO 186 I=1,LWF                                                  VS  2122
        GAMMA(I)=0.                                                     VS  2123
        GAMP(I)=0.                                                      VS  2124
        READ(02) (AW(K),K=1,LWF)                                        VS  2125
        DO 186 J=1,LWF                                                  VS  2126
        GAMP(I)=GAMP(I)-AW(J)*GAMB(J)                                   VS  2127
  186 GAMMA(I)=GAMMA(I)-AW(J)*CA(J)                                     VS  2128
  185 CONTINUE                                                          VS  2129
C       WRITE(JPT,7)(GAMMA(I),I=1,LWF)                                  VS  2130
        DO 115 I=1,LWF                                                  VS  2131
        IF(NALP.EQ.1) GAMP(I)=GAMMA(I)                                  VS  2132
  115 CP(I)=GAMMA(I)                                                    VS  2133
        CPAUG(200)=LWF                                                  VS  2134
        RETURN                                                          VS  2135
        END                                                             VS  2136
C        FORTRAN NLSTIN                                                 VS  2137
        SUBROUTINE INVN(DO,CP,AW,LAT,NALP,N,IP,NAUG)                    VS  2138
C       TO INVERT THE DOWNWASH COEFF. MATRIX                            VS  2139
        DIMENSION IPIVOT(200),IWK(400)                                  VS  2140
C  ABOVE REQUIRED FOR THE NASA/LARC ROUTINE MATINV.                     VS  2141
        DIMENSION DO(IP,IP),CP(1),AW(1)                                 VS  2142
C                                                                       VS  2143
C       SETDIM IS TO SET UP ARRAY TABLE FOR MATRIX INVERSION, AND MAY NOT VS  2144
C       BE NEEDED IF OTHER INVERSION ROUTINES ARE USED.                 VS  2145
C                                                                       VS  2146
        IA=IP                                                           VS  2147
C       CALL SETDIM(DO,IA,IA)                                           VS  2148
        IF(NAUG.EQ.1) GO TO 2                                           VS  2149
        IF(NALP.EQ.1) GO TO 10                                          VS  2150
    2 CONTINUE                                                          VS  2151
        REWIND 01                                                       VS  2152
        DO 1 I=1,N                                                      VS  2153
        READ(01) (AW(K),K=1,N)                                          VS  2154
        READ(01) (CP(K),K=1,N)                                          VS  2155
        DO 1 J=1,N                                                      VS  2156
    1 DO(I,J)=AW(J)                                                     VS  2157
```

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C
C     DO IS THE MATRIX TO BE INVERTED. AW IS A WORKING ARRAY. THE
C     INVERTED MATRIX IS RETURNED IN DO.
C
C
C     CALL HEMINV(DO,N,AW)
      CALL MATINV(IA,N,DO,0,AW,1,DETERM,ISCALE,IPIVOT,IWK)
      IF (DETERM.NE.0.)  GO TO 102
      PRINT 101
  101 FORMAT(" SINGULAR MATRIX, CANNOT INVERT, STOP IN INVN")
      STOP
  102 CONTINUE
      DO 5 I=1,N
    5 WRITE(02) (DO(I,K),K=1,N)
   10 IF(LAT.NE.1) GO TO 25
      REWIND 01
      DO 15 I=1,N
      READ(01) (AW(K),K=1,N)
      READ(01) (CP(K),K=1,N)
      DO 15 J=1,N
   15 DO(I,J)=CP(J)
C     CALL HEMINV(DO,N,AW)
      CALL MATINV(IA,N,DO,0,AW,1,DETERM,ISCALE,IPIVOT,IWK)
      IF (DETERM.NE.0.)  GO TO 103
      PRINT 101
      STOP
  103 CONTINUE
      DO 20 I=1,N
   20 WRITE(02) (DO(I,K),K=1,N)
   25 RETURN
      END
C      FORTRAN NLSTIN
      SUBROUTINE WING (AW,BW,LPANEL,I,BB,LPAN1,LAT,CS,SS,YK
     1,DC,DS,IWING,ZB,YB,YBB,IWGLT,IV,NC1,ZZCP,KF,BREAK)
C     TO CALCULATE DOWNWASH COEFF. MATRIX OF WINGS DUE TO WINGS
      DIMENSION AW(1),LPAN1(1),IWING(1),IWGLT(1),IV(1)
      DIMENSION BW(1),ZZCP(1),WV(4),VW(4),BREAK(6,1)
      DIMENSION W(2),W1(2),YK(6,1),DC(6,1),DS(6,1),V(2),V1(2)
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),
     1NFP(6),NW(6,2)
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)
      LG=1
      IF (NGRD .EQ. 1) LG=2
      NASYM=YCON(50)
      W1(1)=0.
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      V1(1)=0.                                                          VS  2207
      IPN=1                                                             VS  2208
      IP=1                                                              VS  2209
      B1=BB                                                             VS  2210
      IZ=1                                                              VS  2211
      IW=1                                                              VS  2212
      IFF=1                                                             VS  2213
      K=1                                                               VS  2214
      NN=NW(K,I)                                                        VS  2215
      ZA=0.                                                             VS  2216
      YA=BREAK(1,1)                                                     VS  2217
      YAA=BREAK(1,1)                                                    VS  2218
      IF(NASYM.EQ.0) GO TO 40                                           VS  2219
      YA=YK(1,NC1)                                                      VS  2220
      YAA=YA                                                            VS  2221
      IF(NC1.EQ.1) GO TO 40                                             VS  2222
      NC11=NC1-1                                                        VS  2223
      DO 41 J=1,NC11                                                    VS  2224
      ZA=ZA+(YK(K,J)-YK(K,J+1))*DS(K,J+1)                               VS  2225
   41 YAA=YAA+(YK(K,J)-YK(K,J+1))*DC(K,J+1)                             VS  2226
      YA=YK(K,1)                                                        VS  2227
   40 CONTINUE                                                          VS  2228
      YAP=YA                                                            VS  2229
      YAAP=YAA                                                          VS  2230
      DO 16 J=1,LPANEL                                                  VS  2231
      NL=NW(K,1)                                                        VS  2232
      COSD=DC(K,IPN)                                                    VS  2233
      SIND=DS(K,IPN)                                                    VS  2234
      V1(2)=0.                                                          VS  2235
      W1(2)=0.                                                          VS  2236
      W(2)=0.                                                           VS  2237
      V(2)=0.                                                           VS  2238
      WV(3)=0.                                                          VS  2239
      WV(4)=0.                                                          VS  2240
      VW(3)=0.                                                          VS  2241
      VW(4)=0.                                                          VS  2242
      MI=J-IFF+1                                                        VS  2243
      ISN=1                                                             VS  2244
      IF (J.GT. LPAN1(K).AND.J.LE.LPN(K)) ISN=2                         VS  2245
      IF(J.GT.LPAN1(K).AND.J.LE.LPN(K)) GO TO 20                        VS  2246
      GO TO 21                                                          VS  2247
   20 NL=NW(K,2)                                                        VS  2248
   21 CONTINUE                                                          VS  2249
      FN=NL                                                             VS  2250
      NK=NL                                                             VS  2251
      IF(J.GE.LPAN1(K).AND.J.LT.LPN(K)) NK=NW(K,2)                      VS  2252
      IF(J.EQ.LPN(K).AND.J.LT.LPANEL) NK=NW(K+1,1)                      VS  2253
      X1=XN(J,1)-XCP(I)                                                 VS  2254
      X2=XN(J,2)-XCP(I)                                                 VS  2255
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      X12=XN(J,2)-XN(J,1)                                                VS  2256
      ISM=2                                                              VS  2257
      IF (IV(K).EQ.1) ISM=1                                              VS  2258
      IF(NASYM.EQ.1) ISM=1                                               VS  2259
      DO 15 II=1,ISM                                                     VS  2260
      IF (II.EQ.1) GO TO 2                                               VS  2261
      N=1                                                                VS  2262
      GO TO 3                                                            VS  2263
    2 N=2                                                                VS  2264
    3 CONTINUE                                                           VS  2265
      DO 15 KK=1,LG                                                      VS  2266
      KIG=II+KK-1                                                        VS  2267
      IF (KK .EQ. 2) KIG=II+KK                                           VS  2268
      IF(ABS(CS-COSD).GT.0.001) GO TO 31                                 VS  2269
      IF(ABS(SS-SIND).GT.0.001) GO TO 31                                 VS  2270
      IF(NC(K).GT.1) GO TO 31                                            VS  2271
      IF (II .EQ. 1 .AND. KK .EQ. 1) GO TO 30                            VS  2272
   31 CONTINUE                                                           VS  2273
      PS=SIND                                                            VS  2274
      PC=COSD                                                            VS  2275
      QS=SS                                                              VS  2276
      QC=CS                                                              VS  2277
      GO TO 35                                                           VS  2278
   30 PS=0.                                                              VS  2279
      PC=1.                                                              VS  2280
      QS=0.                                                              VS  2281
      QC=1.                                                              VS  2282
   35 CONTINUE                                                           VS  2283
      Y12=YN(J,2)-YN(J,1)                                                VS  2284
      Z12=ZN(J,2)-ZN(J,1)+Y12*PS                                         VS  2285
      Y12=Y12*PC                                                         VS  2286
      YC=(-1.)**N*(YBB+(YCP(I)-YB)*QC)                                   VS  2287
      Y1=YAA+(YN(J,1)-YA)*PC-YC                                          VS  2288
      Y2=YAA+(YN(J,2)-YA)*PC-YC                                          VS  2289
      XYK=X1*Y12-Y1*X12                                                  VS  2290
      IF (KK .EQ. 1) GO TO 18                                            VS  2291
      ZC=-2.*(ZCP(I)+ZB+(YCP(I)-YB)*QS+HEIGHT)+ZCP(I)+ZB+(YCP(I)-YB)*QS  VS  2292
      FCON=1.                                                            VS  2293
      GO TO 19                                                           VS  2294
   18 ZC=ZCP(I)+ZB+(YCP(I)-YB)*QS                                        VS  2295
      ZZCP(I)=ZC                                                         VS  2296
      FCON=0.                                                            VS  2297
   19 CONTINUE                                                           VS  2298
      Z1=ZN(J,1)-ZC+ZA+(YN(J,1)-YA)*PS                                   VS  2299
      Z2=ZN(J,2)-ZC+ZA+(YN(J,2)-YA)*PS                                   VS  2300
      XZJ=X1*Z12-Z1*X12                                                  VS  2301
      UCOM=-Z1*Y12*(-ATT)*FCON                                           VS  2302
      YZI=Y1*Z12-Z1*Y12                                                  VS  2303
      ALB1=XYK*XYK+XZJ*XZJ+B1*YZI*YZI                                    VS  2304
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      R1B1=SQRT(X1*X1+B1*Y1*Y1+B1*Z1*Z1)                                    VS  2305
      R2B1=SQRT(X2*X2+B1*Y2*Y2+B1*Z2*Z2)                                    VS  2306
      UUB1=(X2*X12+B1*Y2*Y12+B1*Z2*Z12)/R2B1-(X1*X12+B1*Y1*Y12+B1*Z1*Z12VS  2307
     1)/R1B1                                                               VS  2308
      G1B1=(1.-X1/R1B1)/(Y1*Y1+Z1*Z1)                                       VS  2309
      G2B1=(1.-X2/R2B1)/(Y2*Y2+Z2*Z2)                                       VS  2310
      F1=UUB1*(UCOM+XYK)/ALB1                                               VS  2311
      F2=-Y2*G2B1+Y1*G1B1                                                   VS  2312
      F3=-XZJ*UUB1/ALB1                                                     VS  2313
      F4=Z2*G2B1-Z1*G1B1                                                    VS  2314
      CKF=CH(IZ)*SN(K,MI,ISN)/(8.*FN)                                       VS  2315
      WV(KIG)=Y1*G1B1*QC*CKF                                                VS  2316
      VW(KIG)=-Z1*G1B1*QS*CKF                                               VS  2317
      IF (IP .EQ. 1 .AND. KF .NE. 0) F2=-Y2*G2B1                            VS  2318
      IF (IP .EQ. 1 .AND. KF .NE. 0) F4=Z2*G2B1                             VS  2319
      IF (KK .EQ. 2) GO TO 25                                               VS  2320
      W(II)=(F1+F2)*CH(IZ)*SN(K,MI,ISN)/(8.*FN)                             VS  2321
      V(II)=(F3+F4)*CH(IZ)*SN(K,MI,ISN)/(8.*FN)                             VS  2322
      W(II)=W(II)*QC                                                        VS  2323
      V(II)=V(II)*QS                                                        VS  2324
      GO TO 15                                                              VS  2325
   25 W1(II)=(F1+F2)*CH(IZ)*SN(K,MI,ISN)/(8.*FN)                            VS  2326
      V1(II)=(F3+F4)*CH(IZ)*SN(K,MI,ISN)/(8.*FN)                            VS  2327
      W1(II)=W1(II)*QC                                                      VS  2328
      V1(II)=V1(II)*QS                                                      VS  2329
   15 CONTINUE                                                              VS  2330
      AW(J)=W(1)+W(2)-W1(1)-W1(2)-(V(1)-V(2)+V1(1)-V1(2))                   VS  2331
      BW(J)=W(1)-W(2)-W1(1)+W1(2)-(V(1)+V(2)+V1(1)+V1(2))                   VS  2332
      KVW=0                                                                 VS  2333
      IF(IP.EQ.1.AND.KF.NE.0)  KVW=1                                        VS  2334
      IF(KVW.EQ.1.AND.IV(K).EQ.0) BW(J)=BW(J)+WV(1)-WV(2)-WV(3)+WV(4)       VS  2335
     1-(VW(1)+VW(2)+VW(3)+VW(4))                                            VS  2336
      IF(J.LT.NN) GO TO 17                                                  VS  2337
      IF(J.EQ.LPANEL) GO TO 16                                              VS  2338
      IP=IP+1                                                               VS  2339
      IZ=IZ+1                                                               VS  2340
      IW=IW+1                                                               VS  2341
      IFF=NN+1                                                              VS  2342
      NN=NN+NK                                                              VS  2343
      IF(IWING(K).NE.0 .AND.IW.EQ.(IWING(K)+1)) GO TO 14                    VS  2344
      IF(J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) GO TO 32                             VS  2345
      IF(YLE(IZ).LT.YK(K,IPN)) GO TO 17                                     VS  2346
   14 CONTINUE                                                              VS  2347
      NJ=0                                                                  VS  2348
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NJ=1                                    VS  2349
      IF(NJ.EQ.1) IPN=IPN+1                                                 VS  2350
      ZA=ZA+(YK(K,IPN)-YA)*DS(K,IPN)                                        VS  2351
      YAA=YAA+(YK(K,IPN)-YA)*DC(K,IPN)                                      VS  2352
      YA=YK(K,IPN)                                                          VS  2353
```

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      IF (IWING(K).NE.0.AND.IW.EQ.(IWING(K)+1)) GO TO 22                VS  2354
      GO TO 23                                                          VS  2355
                                                                        VS  2356
   22 IF (IWGLT(K).EQ.1) GO TO 23                                       VS  2357
   32 ZA=0.                                                             VS  2358
      YA=BREAK(K,1)                                                     VS  2359
      YAA=BREAK(K,1)                                                    VS  2360
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YA=YAP                           VS  2361
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YAA=YAAP                         VS  2362
      IF(J.EQ.LPN(K).AND.K.LT.6) YA=BREAK(K+1,1)                        VS  2363
      IF(J.EQ.LPN(K).AND.K.LT.6) YAA=BREAK(K+1,1)                       VS  2364
      IF(J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) GO TO 23                         VS  2365
      IF (IWGLT(K).NE.2) GO TO 23                                       VS  2366
      ZA=YK(K,NC(K)-2)*DS(K,1)                                          VS  2367
      YAA=YK(K,NC(K)-2)*DC(K,1)                                         VS  2368
      YA=YK(K,NC(K)-2)                                                  VS  2369
   23 CONTINUE                                                          VS  2370
      IF(NJ.NE.1) IPN=IPN+1                                             VS  2371
      IF (J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) IPN=1                           VS  2372
                                                                        VS  2373
   17 KH=0                                                              VS  2374
      IF(J.EQ.LPAN1(K).AND.J.NE.LPN(K)) KH=1                            VS  2375
      IF(KH.EQ.1.AND.K.EQ.1) IW=IW-NS(K)                                VS  2376
      IF(KH.EQ.1.AND.K.GT.1) IW=IW-NS(K)+NS(K-1)                        VS  2377
      IF(J.EQ.LPAN1(K)) IP=1                                            VS  2378
      IF(J.EQ.LPN(K)) IP=1                                              VS  2379
   16 IF (J.EQ.LPN(K)) K=K+1                                            VS  2380
      RETURN                                                            VS  2381
      END                                                               VS  2382
C      FORTRAN NLSTIN                                                   VS  2383
      SUBROUTINE UNFW (LPANEL,B1,AW,BW,NC1)                             VS  2384
C     TO CALCULATE DOWNWASH COEFF. ON FUSELAGE DUE TO WINGS             VS  2385
      DIMENSION SF(10),CF(10),AW(1),W(4),BW(1)                          VS  2386
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS  2387
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,RDX,XU   VS  2388
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  2389
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  2390
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  2391
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  2392
     1NFP(6),NW(6,2)                                                    VS  2393
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT, VS  2394
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)            VS  2395
      COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),NAL(6)           VS  2396
     1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6) VS  2397
     1,ICAMT(6)                                                         VS  2398
      DATA W /4*0./                                                     VS  2399
      PI=3.14159265                                                     VS  2400
      REWIND 03                                                         VS  2401
      LG=1                                                              VS  2402
      IF (NGRD .EQ. 1) LG=2
      NASYM=YCON(50)
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      TH1=SNP(5,20)                                                    VS  2403
      NH1=SNP(5,19)                                                    VS  2404
      DO 1 I=1,NCUM                                                    VS  2405
      IF (NH1 .NE. 0 .AND. I .LE. NH1) GO TO 41                        VS  2406
      FI=I-NH1                                                         VS  2407
      FCUM=NCUM-NH1                                                    VS  2408
      PP=PI-TH1                                                        VS  2409
      TP=TH1                                                           VS  2410
      GO TO 42                                                         VS  2411
   41 FI=I                                                             VS  2412
      FCUM=NH1                                                         VS  2413
      PP=TH1                                                           VS  2414
      TP=0.                                                            VS  2415
   42 CONTINUE                                                         VS  2416
      T=(2.*FI-1.)*PP/(2.*FCUM)+TP                                     VS  2417
      CF(I)=COS(T)                                                     VS  2418
    1 SF(I)=SIN(T)                                                     VS  2419
      KCON=NF+1                                                        VS  2420
      KC=NCUM                                                          VS  2421
      DO 5 I=1,KCON                                                    VS  2422
      IF (I .EQ. KCON) KC=1                                            VS  2423
      IP=1                                                             VS  2424
      IPN=1                                                            VS  2425
      IW=1                                                             VS  2426
      K=1                                                              VS  2427
      IZ=1                                                             VS  2428
      IFF=1                                                            VS  2429
      NN=NW(K,1)                                                       VS  2430
      ZA=0.                                                            VS  2431
      YA=BREAK(K,1)                                                    VS  2432
      YAA=BREAK(K,1)                                                   VS  2433
      IF (NASYM .EQ. 0) GO TO 40                                       VS  2434
      YA=YBREAK(K,NC1)                                                 VS  2435
      YAA=YA                                                           VS  2436
      IF (NC1 .EQ. 1) GO TO 40                                         VS  2437
      NC11=NC1-1                                                       VS  2438
      DO 411 J=1,NC11                                                  VS  2439
      ZA=ZA+(YBREAK(K,J)-YBREAK(K,J+1))*DSIN(K,J+1)                    VS  2440
  411 YAA=YAA+(YBREAK(K,J)-YBREAK(K,J+1))*DCOS(K,J+1)                  VS  2441
      YA=YBREAK(K,I)                                                   VS  2442
   40 CONTINUE                                                         VS  2443
      YAP=YA                                                           VS  2444
      YAAP=YAA                                                         VS  2445
      DO 10 J=1,LPANEL                                                 VS  2446
      ISN=1                                                            VS  2447
      NL=NW(K,1)                                                       VS  2448
      COSD=DCOS(K,IPN)                                                 VS  2449
      SIND=DSIN(K,IPN)                                                 VS  2450
      MI=J-IFF+1                                                       VS  2451
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      IF (J .GT. LPAN1(K) .AND. J .LE. LPN(K)) ISN=2                    VS  2452
      IF (J .GT. LPAN1(K) .AND. J .LE. LPN(K)) NL=NW(K,2)               VS  2453
      CHORD=CH(IZ)                                                      VS  2454
      FN=NL                                                             VS  2455
      NK=NL                                                             VS  2456
      IF(J .GE. LPAN1(K) .AND. J .LT. LPN(K)) NK=NW(K,2)                VS  2457
      IF(J .EQ. LPN(K) .AND. J .LT. LPANEL) NK=NW(K+1,1)                VS  2458
      DO 15 KI=1,KC                                                     VS  2459
      IF (I .EQ. KCON) GO TO 22                                         VS  2460
      X=XCF(I)                                                          VS  2461
      Y=RF(I)*SF(KI)                                                    VS  2462
      Z=RF(I)*CF(KI)                                                    VS  2463
      GO TO 23                                                          VS  2464
   22 X=XLEF                                                            VS  2465
      Y=0.                                                              VS  2466
      Z=0.                                                              VS  2467
   23 CONTINUE                                                          VS  2468
      X1=XN(J,1)-X                                                      VS  2469
      X2=XN(J,2)-X                                                      VS  2470
      X12=XN(J,2)-XN(J,1)                                               VS  2471
      ISM=2                                                             VS  2472
      IF (IV(K) .EQ. 1) ISM=1                                           VS  2473
      IF (NASYM .EQ. 1) ISM=1                                           VS  2474
      DO 15 II=1,ISM                                                    VS  2475
      FCP=1.                                                            VS  2476
      IF (II .EQ. 2) FCP=-1.                                            VS  2477
      W(II)=0.                                                          VS  2478
      W(II+2)=0.                                                        VS  2479
      DO 15 KK=1,LG                                                     VS  2480
      PS=SIND                                                           VS  2481
      PC=COSD                                                           VS  2482
      Y12=YN(J,2)-YN(J,1)                                               VS  2483
      Z12=ZN(J,2)-ZN(J,1)+Y12*PS                                        VS  2484
      Y12=Y12*PC                                                        VS  2485
      YC=Y*FCP                                                          VS  2486
      Y1=YAA+(YN(J,1)-YA)*PC-YC                                         VS  2487
      Y2=YAA+(YN(J,2)-YA)*PC-YC                                         VS  2488
      XYK=X1*Y12-Y1*X12                                                 VS  2489
      IF (KK .EQ. 1) GO TO 18                                           VS  2490
      ZC=-2.*(Z+HEIGHT)+Z                                               VS  2491
      FCON=1.                                                           VS  2492
      GO TO 19                                                          VS  2493
   18 ZC=Z                                                              VS  2494
      FCON=0.                                                           VS  2495
   19 CONTINUE                                                          VS  2496
      Z1=ZN(J,1)-ZC+ZA+(YN(J,1)-YA)*PS                                  VS  2497
      Z2=ZN(J,2)-ZC+ZA+(YN(J,2)-YA)*PS                                  VS  2498
      XZJ=X1*Z12-Z1*X12                                                 VS  2499
      UCOM=-Z1*Y12*(-ATT)*FCON                                          VS  2500
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      YZI=Y1*Z12-Z1*Y12                                                    VS  2501
      ALB1=XYK*XYK+XZJ*XZJ+B1*YZI*YZI                                      VS  2502
      R1B1=SQRT(X1*X1+B1*Y1*Y1+B1*Z1*Z1)                                   VS  2503
      R2B1=SQRT(X2*X2+B1*Y2*Y2+B1*Z2*Z2)                                   VS  2504
      UUB1=(X2*X12+B1*Y2*Y12+B1*Z2*Z12)/R2B1-(X1*X12+B1*Y1*Y12+B1*Z1*Z12VS  2505
     1)/R1B1                                                               VS  2506
      G1B1=(1.-X1/R1B1)/(Y1*Y1+Z1*Z1)                                      VS  2507
      G2B1=(1.-X2/R2B1)/(Y2*Y2+Z2*Z2)                                      VS  2508
      F12=UUB1*(UCOM+XYK)/ALB1                                             VS  2509
      G12=-Y2*G2B1+Y1*G1B1                                                 VS  2510
      IF(IP.EQ.1.AND.IV(K).EQ.1) G12=-Y2*G2B1                              VS  2511
      IF (I .EQ. KCON) GO TO 30                                            VS  2512
      F13=UUB1*XZJ/ALB1                                                    VS  2513
      G13=Z2*G2B1-Z1*G1B1                                                  VS  2514
      IF(IP.EQ.1.AND.IV(K).EQ.1) G13=Z2*G2B1                               VS  2515
      F1=-F13*SF(KI)*FCP+F12*CF(KI)                                        VS  2516
      F2=G13*SF(KI)*FCP+G12*CF(KI)                                         VS  2517
      GO TO 17                                                             VS  2518
   30 F1=F12                                                               VS  2519
      F2=G12                                                               VS  2520
   17 W(II+2)=W(II+2)+(F1+F2)*CHORD*SN(K,MI,ISN)/(8.*FN)                   VS  2521
      IF (IP .NE. 1) GO TO 16                                              VS  2522
      G12=-Y2*G2B1                                                         VS  2523
      G13=Z2*G2B1                                                          VS  2524
      F2=G13*SF(KI)*FCP+G12*CF(KI)                                         VS  2525
      IF (I .EQ. KCON) F2=G12                                              VS  2526
   16 W(II)=W(II)+(F1+F2)*CHORD*SN(K,MI,ISN)/(8.*FN)                       VS  2527
      IF (I .EQ. KCON) GO TO 15                                            VS  2528
      AW(KI)=W(1)+W(2)                                                     VS  2529
      BW(KI)=W(3)-W(4)                                                     VS  2530
   15 CONTINUE                                                             VS  2531
      IF (I .EQ. KCON) GO TO 25                                            VS  2532
      WRITE (03) (AW(KK),KK=1,NCUM)                                        VS  2533
      WRITE (03) (BW(KK),KK=1,NCUM)                                        VS  2534
      GO TO 26                                                             VS  2535
   25 AW(J)=W(1)+W(2)                                                      VS  2536
   26 CONTINUE                                                             VS  2537
      IF (J .LT. NN) GO TO 27                                              VS  2538
      IF (J .EQ. LPANEL) GO TO 10                                          VS  2539
      IP=IP+1                                                              VS  2540
      IZ=IZ+1                                                              VS  2541
      IFF=NN+1                                                             VS  2542
      NN=NN+NK                                                             VS  2543
      IW=IW+1                                                              VS  2544
      IF(IWING(K) .NE. 0 .AND. IW .EQ. (IWING(K)+1)) GO TO 14              VS  2545
      IF (J .EQ. LPAN1(K) .OR. J .EQ. LPN(K)) GO TO 32                     VS  2546
      IF (YLE(IZ) .LT. YBREAK(K,IPN)) GO TO 27                             VS  2547
   14 CONTINUE                                                             VS  2548
      NJ=0                                                                 VS  2549
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      IF (NASYM .EQ. 1 .AND. IPN .LT. NC1) NJ=1                          VS  2550
      IF (NJ .EQ. 1) IPN=IPN+1                                           VS  2551
      ZA=ZA+(YBREAK(K,IPN)-YA)*DSIN(K,IPN)                               VS  2552
      YAA=YAA+(YBREAK(K,IPN)-YA)*DCOS(K,IPN)                             VS  2553
      YA=YBREAK(K,IPN)                                                   VS  2554
      IF (IWING(K).NE.0 .AND. IW.EQ.(IWING(K)+1)) GO TO 52               VS  2555
      GO TO 53                                                           VS  2556
   52 IF (IWGLT(K) .EQ. 1) GO TO 53                                      VS  2557
   32 ZA=0.                                                              VS  2558
      YA=BREAK(K,1)                                                      VS  2559
      YAA=BREAK(K,1)                                                     VS  2560
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YA=YAP                            VS  2561
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YAA=YAAP                          VS  2562
      IF(J.EQ.LPN(K).AND.K.LT.6) YA=BREAK(K+1,1)                         VS  2563
      IF(J.EQ.LPN(K).AND.K.LT.6) YAA=BREAK(K+1,1)                        VS  2564
      IF (J .EQ. LPAN1(K) .OR. J .EQ. LPN(K)) GO TO 53                   VS  2565
      IF (IWGLT(K) .NE. 2) GO TO 53                                      VS  2566
      ZA=YBREAK(K,NC(K)-2)*DSIN(K,1)                                     VS  2567
      YAA=YBREAK(K,NC(K)-2)*DCOS(K,1)                                    VS  2568
      YA=YBREAK(K,NC(K)-2)                                               VS  2569
   53 CONTINUE                                                           VS  2570
      IF (NJ .NE. 1) IPN=IPN+1                                           VS  2571
      IF (J .EQ. LPAN1(K) .OR. J .EQ. LPN(K)) IPN=1                      VS  2572
   27 KH=0                                                               VS  2573
      IF (J .EQ. LPAN1(K) .AND. J .NE. LPN(K)) KH=1                      VS  2574
      IF (KH .EQ. 1 .AND. K .EQ. 1) IW=IW-NS(K)                          VS  2575
      IF (KH .EQ. 1 .AND. K .GT. 1) IW=IW-NS(K)+NS(K-1)                  VS  2576
      IF(J.EQ.LPAN1(K)) IP=1                                             VS  2577
      IF(J.EQ.LPN(K)) IP=1                                               VS  2578
   10 IF(J .EQ. LPN(K)) K=K+1                                            VS  2579
      IF (I .NE. KCON) GO TO 5                                           VS  2580
      WRITE (03) (AW(KK),KK=1,LPANEL)                                    VS  2581
    5 CONTINUE                                                           VS  2582
      RETURN                                                             VS  2583
      END                                                                VS  2584
C       FORTRAN NLSTIN                                                   VS  2585
      SUBROUTINE VELFUS (LPANEL,AW,CW,AM,LPAN1,IWING,NC1,DCOS,DSIN,NASYMVS  2586
     1,YK,LPN,NS,IWGLT,NC,BREAK)                                         VS  2587
C     TO MANIPULATE VELOCITY COMPUTATIONS DUE TO FUSELAGE                VS  2588
      DIMENSION BREAK(6,1)                                               VS  2589
      DIMENSION DCOS(6,1),DSIN(6,1),YK(6,1),LPN(1),NS(1),IWGLT(1),NC(1)  VS  2590
      DIMENSION AW(1),BW(20),CW(1),SSF(5,10),DW(50),LPAN1(1),IWING(1)    VS  2591
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  2592
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  2593
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  2594
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),NJW2(6,2,5),NJW(6,5),NFVS  2595
     1P(6),NW(6,2)                                                       VS  2596
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),   VS  2597
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,XU    VS  2598
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      REWIND 02                                                          VS  2599
      REWIND 04                                                          VS  2600
      B=1.-AM*AM                                                         VS  2601
      PI=3.14159265                                                      VS  2602
      TH1=SNP(5,20)                                                      VS  2603
      NH1=SNP(5,19)                                                      VS  2604
      NTL=NT*NF                                                          VS  2605
      NG=NF                                                              VS  2606
      DO 2 I=1,NT                                                        VS  2607
      FI=I                                                               VS  2608
      DO 2 K=1,NCUM                                                      VS  2609
      IF (NH1 .NE. 0 .AND. K .LE. NH1) GO TO 9                           VS  2610
      FK=K-NH1                                                           VS  2611
      FCUM=NCUM-NH1                                                      VS  2612
      PP=PI-TH1                                                          VS  2613
      TP=TH1                                                             VS  2614
      GO TO 11                                                           VS  2615
    9 FK=K                                                               VS  2616
      FCUM=NH1                                                           VS  2617
      PP=TH1                                                             VS  2618
      TP=0.                                                              VS  2619
   11 CONTINUE                                                           VS  2620
      TA=(2.*FK-1.)*PP/(2.*FCUM)+TP                                      VS  2621
    2 SSF(I,K)=SIN(FI*TA)                                                VS  2622
      IZ=1                                                               VS  2623
      ISTP=1                                                             VS  2624
      MM=NW(1,1)                                                         VS  2625
      NN=NW(1,1)                                                         VS  2626
      IPN=1                                                              VS  2627
      L=1                                                                VS  2628
      ZB=0.                                                              VS  2629
      YB=BREAK(1,1)                                                      VS  2630
      YBB=BREAK(1,1)                                                     VS  2631
      IF(NASYM.EQ.0) GO TO 6                                             VS  2632
      YB=YK(1,NC1)                                                       VS  2633
      YBB=YB                                                             VS  2634
      IF(NC1.EQ.1) GO TO 6                                               VS  2635
      N11=NC1-1                                                          VS  2636
      DO 7 I=1,N11                                                       VS  2637
      ZB=ZB+(YK(1,I)-YK(1,I+1))*DSIN(1,I+1)                              VS  2638
    7 YBB=YBB+(YK(1,I)-YK(1,I+1))*DCOS(1,I+1)                            VS  2639
      YB=YK(1,1)                                                         VS  2640
    6 CONTINUE                                                           VS  2641
      YBP=YB                                                             VS  2642
      YBBP=YBB                                                           VS  2643
      DO 1 I=1,LPANEL                                                    VS  2644
      CSD=DCOS(L,IPN)                                                    VS  2645
      SSD=DSIN(L,IPN)                                                    VS  2646
      X=XCP(I)                                                           VS  2647
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      Y=YBB+(YCP(I)-YB)*CSD                                              VS  2648
      Z=ZCP(I)+ZB+(YCP(I)-YB)*SSD                                        VS  2649
      CW(1)=0.                                                           VS  2650
      CALL UNWF(B,X,Y,Z,AW,CW,CSD,SSD)                                   VS  2651
      WRITE(02) (AW(K),K=1,NTL)                                          VS  2652
      WRITE(04)(CW(K),K=1,NTL)                                           VS  2653
      IF(I.GE.LPAN1(L).AND.I.LT.LPN(L)) NN=NW(L,2)                       VS  2654
      IF(I.EQ.LPN(L).AND.I.LT.LPANEL) NN=NW(L+1,1)                       VS  2655
      IF(I.LT.MM) GO TO 8                                                VS  2656
      MM=MM+NN                                                           VS  2657
      ISTP=ISTP+1                                                        VS  2658
      IZ=IZ+1                                                            VS  2659
      IF(IWING(L).NE.0.AND.ISTP.EQ.(IWING(L)+1)) GO TO 33                VS  2660
      IF(I.EQ.LPAN1(L).OR.I.EQ.LPN(L)) GO TO 33                          VS  2661
      IF(ISTP.EQ.(NS(L)+1)) GO TO 36                                     VS  2662
      IF(YLE(IZ).LT.YK(L,IPN)) GO TO 8                                   VS  2663
   33 CONTINUE                                                           VS  2664
      NI=0                                                               VS  2665
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NI=1                                 VS  2666
      IF(NI.EQ.1) IPN=IPN+1                                              VS  2667
      ZB=ZB+(YK(L,IPN)-YB)*DSIN(L,IPN)                                   VS  2668
      YBB=YBB+(YK(L,IPN)-YB)*DCOS(L,IPN)                                 VS  2669
      YB=YK(L,IPN)                                                       VS  2670
      IF(IWING(L).NE.0.AND.ISTP.EQ.(IWING(L)+1)) GO TO 34                VS  2671
      IF(I.EQ.LPAN1(L).OR.I.EQ.LPN(L)) GO TO 36                          VS  2672
      GO TO 35                                                           VS  2673
   34 IF(IWGLT(L).EQ.1) GO TO 35                                         VS  2674
   36 ZB=0.                                                              VS  2675
      YB=BREAK(L,1)                                                      VS  2676
      YBB=BREAK(L,1)                                                     VS  2677
      IF(NASYM.EQ.1.AND.I.EQ.LPAN1(L)) YB=YBP                            VS  2678
      IF(NASYM.EQ.1.AND.I.EQ.LPAN1(L)) YBB=YBBP                          VS  2679
      IF(I.EQ.LPN(L).AND.L.LT.6) YB=BREAK(L+1,1)                         VS  2680
      IF(I.EQ.LPN(L).AND.L.LT.6) YBB=BREAK(L+1,1)                        VS  2681
      IF(I.EQ.LPN(L)) GO TO 35                                           VS  2682
      IF(ISTP.EQ.(NS(L)+1)) GO TO 35                                     VS  2683
      IF(IWGLT(L).NE.2) GO TO 35                                         VS  2684
      ZB=YK(L,NC(L)-2)*DSIN(L,1)                                         VS  2685
      YBB=YK(L,NC(L)-2)*DCOS(L,1)                                        VS  2686
      YB=YK(L,NC(L)-2)                                                   VS  2687
   35 CONTINUE                                                           VS  2688
      IF(NI.NE.1) IPN=IPN+1                                              VS  2689
      IF(I.EQ.LPAN1(L).OR.I.EQ.LPN(L)) IPN=1                             VS  2690
    8 KH=0                                                               VS  2691
      IF(I.EQ.LPAN1(L).AND.I.NE.LPN(L)) KH=1                             VS  2692
      IF(KH.EQ.1.AND.L.EQ.1) IZ=IZ-NS(L)                                 VS  2693
      IF(KH.EQ.1.AND.L.GT.1) IZ=IZ-NS(L)+NS(L-1)                         VS  2694
      IF(I.EQ.LPN(L).AND.NW(L,2).NE.0) KH=2                              VS  2695
      IF(KH.EQ.2.AND.L.EQ.1) IZ=IZ+NS(L)                                 VS  2696
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      IF(KH.EQ.2.AND.L.GT.1) IZ=IZ+NS(L)-NS(L-1)                        VS  2697
      IF(KH.EQ.1.AND.L.EQ.1) ISTP=ISTP-NS(L)                           VS  2698
      IF(KH.EQ.1.AND.L.GT.1) ISTP=ISTP-NS(L)+NS(L-1)                   VS  2699
      IF(I.EQ.LPN(L)) L=L+1                                            VS  2700
    1 CONTINUE                                                         VS  2701
      CALL UNFW (LPANEL,B,AW,DW,NC1)                                   VS  2702
      DO 5 I=1,NT                                                      VS  2703
      REWIND 03                                                        VS  2704
      N=I                                                              VS  2705
      DO 10 J=1,NF                                                     VS  2706
      JJ=J                                                             VS  2707
      DO 15 K=1,LPANEL                                                 VS  2708
      READ (03) (BW(KK),KK=1,NCUM)                                     VS  2709
      READ (03) (DW(KK),KK=1,NCUM)                                     VS  2710
      AN=0.                                                            VS  2711
      BN=0.                                                            VS  2712
      DO 20 KK=1,NCUM                                                  VS  2713
      IF(NH1.NE.0.AND.KK.LE.NH1) GO TO 12                              VS  2714
      FCUM=NCUM-NH1                                                    VS  2715
      PP=PI-TH1                                                        VS  2716
      GO TO 13                                                         VS  2717
   12 FCUM=NH1                                                         VS  2718
      PP=TH1                                                           VS  2719
   13 CONTINUE                                                         VS  2720
      BN=BN+DW(KK)*SSF(I,KK)*PP/FCUM                                   VS  2721
   20 AN=AN+BW(KK)*CSF(I,KK)*PP/FCUM                                   VS  2722
      AN=AN*2./PI                                                      VS  2723
      BN=BN*2./PI                                                      VS  2724
      CW(K)=BN*RF(J)**(I+1)                                            VS  2725
   15 AW(K)=AN*RF(J)**(I+1)                                            VS  2726
      CALL FUSELA (NG,BW,N,JJ,XAS,XTEF,XF,XCF,RF,R,SNP,NKF)            VS  2727
      DO 25 KK=1,NTL                                                   VS  2728
      N1=(I-1)*NF+1                                                    VS  2729
      N2=I*NF                                                          VS  2730
      NB=KK+LPANEL                                                     VS  2731
      IF (KK .GE. N1 .AND. KK .LE. N2) GO TO 26                        VS  2732
      AW(NB)=0.                                                        VS  2733
      CW(NB)=0.                                                        VS  2734
      GO TO 25                                                         VS  2735
   26 NK=KK-N1+1                                                       VS  2736
      AW(NB)=BW(NK)                                                    VS  2737
      CW(NB)=BW(NK)                                                    VS  2738
   25 CONTINUE                                                         VS  2739
      WRITE (04) (CW(K),K=1,LWF)                                       VS  2740
   10 WRITE (02) (AW(K),K=1,LWF)                                       VS  2741
    5 CONTINUE                                                         VS  2742
      RETURN                                                           VS  2743
      END                                                              VS  2744
C      FORTRAN NLSTIN                                                  VS  2745
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      SUBROUTINE FALONE(B,CS,AW,CA,GAMMA)                                VS  2746
C     TO CALCULATE THE SOURCE DISTRIBUTION FOR THE FUSELAGE VOLUME       VS  2747
C     EFFECT                                                             VS  2748
      DIMENSION AW(1),CA(1),GAMMA(1)                                     VS  2749
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),   VS  2750
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,RDX,X1    VS  2751
                                                                         VS  2752
      N=0                                                                VS  2753
      PI=3.14159265                                                      VS  2754
      NI=NF                                                              VS  2755
      NF1=NF+1                                                           VS  2756
      S=XTEF-XLEF                                                        VS  2757
      DO 5 I=1,NF                                                        VS  2758
      IJ=I                                                               VS  2759
      XS=XCF(IJ)-XTEF                                                    VS  2760
      IF(I.EQ.NF) RFL=0.                                                 VS  2761
      IF(I.NE.NF) RFL=XS/SQRT(XS*XS+B*RF(IJ)*RF(IJ))                     VS  2762
      CALL FUSELA(NI,AW,N,IJ,XAS,XTEF,XF,XCF,RF,B,SNP,NKF)               VS  2763
      XD=XCF(IJ)                                                         VS  2764
      XEF=XCF(IJ)-XLEF                                                   VS  2765
      AW(NF1)=-SLOP(XD)*CS-(RFL-XEF/SQRT(XEF*XEF+B*RF(IJ)*RF(IJ)))       VS  2766
     1*FO/(4.*PI)                                                        VS  2767
      IF(I.NE.1) GO TO 10                                                VS  2768
      DO 15 K=1,NF                                                       VS  2769
   15 GAMMA(K)=-AW(K+1)/AW(1)                                            VS  2770
      NJ=NF-1                                                            VS  2771
      GO TO 5                                                            VS  2772
   10 CALL VMSEON(NJ,IJ,AW,GAMMA,CA)                                     VS  2773
      NJ=NJ-1                                                            VS  2774
    5 CONTINUE                                                           VS  2775
      DO 12 I=1,NF                                                       VS  2776
   12 WARD(I)=GAMMA(I)                                                   VS  2777
      RETURN                                                             VS  2778
      END                                                                VS  2779
C      LINK    LINK33,LINK22                                             VS  2780
C      FORTRAN NLSTIN                                                    VS  2781
      SUBROUTINE SOLUTN                                                  VS  2782
C     TO MANIPULATE AND OBTAIN THE TOTAL AERODYNAMIC RESULTS             VS  2783
      DIMENSION GAMMA(10105)                                             VS  2784
      DIMENSION AW(200),CA(201),DMM(50)                                  VS  2785
      COMMON/LOOP/KP,NALP,KALP,TANC2,CLDS,AL,CLII,ALPII,ALPA(15)         VS  2786
      COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(200),LAT,CREF,BREF2          VS  2787
      COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),NAL(6)            VS  2788
     1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6)  VS  2789
     1,ICAMT(6)                                                          VS  2790
      COMMON /AJG/ ALP,J1,CP(200),GAMP(200),GAMB(200),GAMR(200)          VS  2791
     1,GAMX(200),ZZCP(200),DZY(200),BMR(6,50),BML(6,50),CSU(50)          VS  2792
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  2793
     1XLL(41)                                                            VS  2794
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  2795
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     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS   2795
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS   2796
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                      VS   2797
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),    VS   2798
     1NFP(6),NW(6,2)                                                      VS   2799
      COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10,   VS   2800
     120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)        VS   2801
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,   VS   2802
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)              VS   2803
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS   2804
     15),DIST,P,BK,RL,CFF                                                 VS   2805
      COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS   2806
     1,4),YLF(6,10,4),SLP1(6,10)                                          VS   2807
      COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,   VS   2808
     120)                                                                 VS   2809
      COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)           VS   2810
      COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)           VS   2811
      COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IAGVX,PT                  VS   2812
     1,NAUG,IBD,PBK,PIS,IDIH,ALPINC,IRL,KT,PI,ALO,ALZ                     VS   2813
     2,NC1,NC2,IBLC                                                       VS   2814
      COMMON/SL/ COSA,SINA,MZ,CTX,YBBK,ZBK,GW,LATT                        VS   2815
      COMMON/GDSL/ DF(6,5),YCN(6,4),NLEF(6),NVRTX(6),SNALP(50),CNALP(50)VS   2816
     1,ALPH(50),AUX(6,5),CPX(6,5),XTILT(6),SLETH(6),YCNTD(6)              VS   2817
     1,NVL1(6),NVL2(6),XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF          VS   2818
     1,BUX(6,5),SE(3,6,15),NUR(6),CVR(50),CPAUG(200)                      VS   2819
     1,ALPBD(6,2),MX(6),ALBDBR(6,2),ALBDBL(6,2),MVRTX(6)                  VS   2820
      COMMON /INOUT/ INPT,JPT                                             VS   2821
    2 FORMAT (8F10.6)                                                     VS   2822
      LWF=CPAUG(200)                                                      VS   2823
      DO 115 I=1,LWF                                                      VS   2824
  115 GAMMA(I)=CP(I)                                                      VS   2825
      NPP=NALP                                                            VS   2826
      CL(50)=XREF                                                         VS   2827
      CM(50)=NSUR                                                         VS   2828
      YCON(50)=NASYM                                                      VS   2829
      CALL THRUST (LPANEL,GAMMA,SNALP,LPAN1,ICAM,ICAMB,NLEF,NAL,          VS   2830
     1IV,IWING,YBREAK,DCOS,DSIN,CSU,IWGLT,0,0.,0.,0.,                     VS   2831
     2CNALP,TFLP,NC1,KT,RC,ICAMT,SWPP,IBLC,GAMP,PBREAK)                   VS   2832
C     WRITE(JPT,2) (CT(I),I=1,NCS)                                        VS   2833
      DO 187 I=1,NCS                                                      VS   2834
      BMP(1,I)=CT(I)-ABS(CSU(I))                                          VS   2835
      BML(1,I)=CM(I)                                                      VS   2836
  187 Y(1,I)=CD(I)                                                        VS   2837
      NL=1                                                                VS   2838
      KCH=1                                                               VS   2839
      K=1                                                                 VS   2840
      LL=1                                                                VS   2841
C       CALCULATION OF SUCTION FROM THRUST                                VS   2842
      DO 2201 I=1,NCS                                                     VS   2843
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      JZ=2                                                              VS  2844
      IF(NLEF(K).EQ.1) JZ=1                                             VS  2845
      SOD=XLL(I)                                                        VS  2846
      COD=XTT(I)                                                        VS  2847
      IF(NW(K,2).EQ.0) GO TO 2202                                       VS  2848
      IF(K.EQ.1) II=KCH+NS(K)                                           VS  2849
      IF(K.GT.1) II=KCH+NS(K)-NS(K-1)                                   VS  2850
      CHL=CH(KCH)+CH(II)                                                VS  2851
      GO TO 2203                                                        VS  2852
 2202 CHL=CH(KCH)                                                       VS  2853
 2203 CONTINUE                                                          VS  2854
      CHORD=CHL                                                         VS  2855
      DZDY=0.                                                           VS  2856
      TSW=SIN(SWEEP(KCH))/COS(SWEEP(KCH))                               VS  2857
      IF(IALP.EQ.1) GO TO 2200                                          VS  2858
      IF(IWING(K).NE.0.AND.I.GT.IWING(K)) GO TO 2205                    VS  2859
      IF(ICAM(K).EQ.2) GO TO 2210                                       VS  2860
      XC=0.                                                             VS  2861
      IF(ICAM(K).EQ.3) XC=XLE(KCH)                                      VS  2862
      Z1=XC                                                             VS  2863
      CALL ZCR(XC,YLE(KCH),CAMLE,ICAM,Z1,K,1,CHORD,DZDY,IST,TSW)        VS  2864
      IF(NLEF(K).EQ.0) GO TO 2220                                       VS  2865
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 2225        VS  2866
      GO TO 2220                                                        VS  2867
 2225 CAMLE=CAMLE+TFLP(K,NL)                                            VS  2868
      GO TO 2220                                                        VS  2869
 2210 YC=YLE(KCH)                                                       VS  2870
      XC=XLE(KCH)                                                       VS  2871
      CALL ZCDX(XC,YC,CAMLE,DZDY)                                       VS  2872
      Z1=YC                                                             VS  2873
 2220 EP=ALPH(I)                                                        VS  2874
      XCS=COS(EP)                                                       VS  2875
      XSS=SIN(EP)                                                       VS  2876
      GO TO 2230                                                        VS  2877
 2200 XCS=1.                                                            VS  2878
      XSS=0.                                                            VS  2879
      CAMLE=0.                                                          VS  2880
      GO TO 2230                                                        VS  2881
 2205 CAMLE=0.                                                          VS  2882
      ICT=ICAMT(K)                                                      VS  2883
      IF(ICT.NE.0) CALL ZCR(XC,YLE(KCH),CAMLE,ICAM,Z1,K,ICT,            VS  2884
     1CHORD,DZDY,IST,TSW)                                               VS  2885
      XCS=COS(ALPH(I))                                                  VS  2886
      XSS=SIN(ALPH(I))                                                  VS  2887
      IF(NLEF(K).EQ.0) GO TO 2230                                       VS  2888
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 2235        VS  2889
      GO TO 2230                                                        VS  2890
 2235 CAMLE=CAMLE+TFLP(K,NL)                                            VS  2891
 2230 CONTINUE                                                          VS  2892
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      CAMY=DZDY                                                          VS  2893
      DZDY=0.                                                            VS  2894
      IF(ICAM(K).LE.1) Z1=0.                                             VS  2895
      FS=COS(SWEEP(KCH))                                                 VS  2896
      SSN=SIN(SWEEP(KCH))                                                VS  2897
      TAN=SSN/FS                                                         VS  2898
      FTAN=TAN                                                           VS  2899
      F1=SQRT(1.+(CAMLE**2+DZDY**2)*COD*COD)                             VS  2900
      F2=SQRT((1.+FTAN*FTAN)*COD*COD+((CAMLE*FTAN+DZDY)*COD+SOD)**2)     VS  2901
      F12=F1*F2                                                          VS  2902
      F3=1.+(DZDY*COD+SOD)*((CAMLE*FTAN+DZDY)*COD+SOD)                   VS  2903
      F4=-CAMLE*COD*COD+(DZDY*COD+SOD)*FTAN*COD                          VS  2904
      IF(ABS(COD).GT.0.1)F5=F12/SQRT(F3*F3+F4*F4)                        VS  2905
      IF(ABS(COD).LE.0.1)F5=1./FS                                        VS  2906
      CSU(I)=CSU(I)*F5                                                   VS  2907
      DMM(I)=CSU(I)*CHL                                                  VS  2908
      BMR(6,I)=CL(I)/FS*CHL                                              VS  2909
      X(14,I)=F5                                                         VS  2910
      X(13,I)=CHL                                                        VS  2911
      X(11,I)=XLE(KCH)                                                   VS  2912
      KCH=KCH+1                                                          VS  2913
      LL=LL+NW(K,1)                                                      VS  2914
      IF(I.NE.NS(K)) GO TO 2231                                          VS  2915
      IF(NW(K,2).EQ.0) GO TO 2231                                        VS  2916
      IF(K.EQ.1) GO TO 2232                                              VS  2917
      KCH=KCH+NS(K)-NS(K-1)                                              VS  2918
      LL=LL+(NS(K)-NS(K-1))*NW(K,2)                                      VS  2919
      GO TO 2231                                                         VS  2920
 2232 KCH=KCH+NS(K)                                                      VS  2921
      LL=LL+NS(K)*NW(K,2)                                                VS  2922
 2231 CONTINUE                                                           VS  2923
      IF((LL+NW(K,1)-1).EQ.MJW2(K,2,NL)) NL=NL+1                         VS  2924
 2201 IF(I.EQ.NS(K)) K=K+1                                               VS  2925
C     WRITE (JPT,2) (DMM(I),I=1,NCS)                                     VS  2926
      DO 901 I=1,LWF                                                     VS  2927
  901 CPAUG(I)=0.                                                        VS  2928
      DO 908 I=1,NCS                                                     VS  2929
  908 CVR(I)=C.                                                          VS  2930
C                                                                        VS  2931
C      VORTEX LIFT AUGMENTATION                                          VS  2932
C     ONLY ONE INBOARD VORTEX PRODUCING LIFT AUGMENTATION IS ALLOWED.    VS  2933
      GW=0.                                                              VS  2934
      MZ=0                                                               VS  2935
      IF(NUMS.EQ.0) GO TO 900                                            VS  2936
      IF(IALP.EQ.1) GO TO 900                                            VS  2937
      IF(NVL2(1).EQ.NS(1)) GO TO 900                                     VS  2938
      IF(IAGVX.EQ.0) GO TO 900                                           VS  2939
      IF(ALP.LT.0.0001) GO TO 900                                        VS  2940
      DO 906 I=1,NCS                                                     VS  2941
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      BMR(3,I)=X(15,I)                                                  VS  2942
  906 BMR(2,I)=DMM(I)                                                   VS  2943
      KD=1                                                              VS  2944
      N1=NVL1(1)                                                        VS  2945
      N2=NVL2(1)                                                        VS  2946
      IF(N1.GT.1) KD=2                                                  VS  2947
      X2=AUX(1,KD)                                                      VS  2948
      SLK=SLETH(1)                                                      VS  2949
      Y2=YCNTD(1)                                                       VS  2950
      TAN1=SIN(SWEEP(N1))/COS(SWEEP(N1))                                VS  2951
      TAN2=SIN(SWEEP(N2))/COS(SWEEP(N2))                                VS  2952
      AP=SNALP(1)*0.5*(TAN1+TAN2)                                       VS  2953
      ZVV=VERCOR(AP)                                                    VS  2954
      Z2=WIDTH(1,KD)*ZVV                                                VS  2955
      Z2=0.                                                             VS  2956
C     WRITE(JPT,2) X2,Y2,Z2,B2                                          VS  2957
      KCOT=1                                                            VS  2958
      KCT=0                                                             VS  2959
  904 CONTINUE                                                          VS  2960
      CALL SPNINT(NVL1(1),NVL2(1),NS,DMM,SJ,SWEEP,M1,X,GM,WIDTH,GW)     VS  2961
      IF(KCT.EQ.1) GO TO 896                                            VS  2962
      GM=GM/SLK                                                         VS  2963
      PSI(KCOT)=GM                                                      VS  2964
C          USE AITKEN'S FORMULA TO EXTRAPOLATE                          VS  2965
      IF(KCOT.GE.3) GM=(PSI(KCOT-2)*PSI(KCOT)-PSI(KCOT-1)**2)/(PSI(KCOT VS  2966
     1-2)-2.*PSI(KCOT-1)+PSI(KCOT))                                     VS  2967
      PSI(KCOT)=GM                                                      VS  2968
C     WRITE(JPT,2) GM                                                   VS  2969
      CALL AUGVOR(AW,CA,CPAUG,GM,LPANEL,X2,Y2,Z2,B2,ZZCP,XCP,YCP,0)     VS  2970
      SLOPE(15)=X2                                                      VS  2971
      SLOPE(14)=Y2                                                      VS  2972
      SLOPE(13)=Z2                                                      VS  2973
      SLOPE(12)=GM                                                      VS  2974
      SLOPE(11)=GW                                                      VS  2975
      IF(KCOT.EQ.1) TGM=GM                                              VS  2976
      MZ=10                                                             VS  2977
      CALL THRUST(LPANEL,CPAUG,SNALP,LPAN1,ICAM,ICAMR,NLEF,NAL,IV,IWING,VS  2978
     1YBREAK,DCOS,DSIN,CVR,IWGLT,MZ,0.,0.,0.,CNALP,TFLP,NC1,KT,RC,ICAMT,VS  2979
     2SWPP,IBLC,GAMP,BREAK)                                             VS  2980
C     WRITE(JPT,2) (CVR(I),I=1,NCS)                                     VS  2981
      DO 905 I=1,NCS                                                    VS  2982
      FC=1.                                                             VS  2983
      IF(CVR(I).LT.0.) FC=-1.                                           VS  2984
      FCC=1.                                                            VS  2985
      CUI=CT(I)*X(14,I)                                                 VS  2986
      IF(CUI.LT.0.) FCC=-1.                                             VS  2987
      CVR(I)=CVR(I)*X(14,I)                                             VS  2988
      CU=2.*FC*FCC*SQRT(ABS(CUI*CVR(I)))+ABS(CVP(I))                    VS  2989
      CVR(I)=FCC*CU                                                     VS  2990
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      IF(KCOT.GE.6) GO TO 905                                              VS  2991
      DMM(I)=BMR(2,I)+CVR(I)*X(13,I)                                       VS  2992
      X(15,I)=BMR(3,I)+CL(I)                                               VS  2993
  905 CONTINUE                                                             VS  2994
      ERR=1.                                                               VS  2995
      IF(KCOT.GE.2) ERR=ABS((PSI(KCOT)-PSI(KCOT-1))/PSI(KCOT-1))           VS  2996
      IF(ERR.LE.0.03) GO TO 897                                            VS  2997
      KCOT=KCOT+1                                                          VS  2998
      IF(KCOT.LE.6) GO TO 904                                              VS  2999
  897 CONTINUE                                                             VS  3000
      KCT=1                                                                VS  3001
      GO TO 904                                                            VS  3002
  896 CONTINUE                                                             VS  3003
      DO 907 I=1,NCS                                                       VS  3004
      DMM(I)=BMR(2,I)+CVR(I)*X(13,I)                                       VS  3005
  907 Y(1,I)=Y(1,I)+CD(I)                                                  VS  3006
      DO 913 I=1,LPANEL                                                    VS  3007
  913 GAMMA(I)=GAMMA(I)+CPAUG(I)                                           VS  3008
      SLOPE(12)=TGM                                                        VS  3009
  900 CONTINUE                                                             VS  3010
C                                                                          VS  3011
C   SIDE-EDGE SUCTION AND STREAMWISE VORTEX DENSITY                        VS  3012
C                                                                          VS  3013
      CM(50)=NSUR                                                          VS  3014
      CALL GAMAX (AW,CA,LPAN1,LPANEL,GAMMA,BREAK,CHORDT,IWING,YCN,CTP,     VS  3015
     1 CTX,IWGLT,0,SE,1)                                                   VS  3016
      DO 188 I=1,LPANEL                                                    VS  3017
  188 GAMX(I)=CA(I)                                                        VS  3018
      DO 1352 I=1,NSUR                                                     VS  3019
      NCW=NW(I,1)+NW(I,2)                                                  VS  3020
      DO 1352 J=1,NCW                                                      VS  3021
      Y(4+I,J)=SE(1,I,J)                                                   VS  3022
 1352 IF(IWING(I).NE.0.OR.NASYM.EQ.1) Y(10+I,J)=DUMT(1,I,J)                VS  3023
      COSA=COS(ALP)                                                        VS  3024
      SINA=SIN(ALP)                                                        VS  3025
      IF(IRL.EQ.1) P=PT*COSA                                               VS  3026
      IF(IRL.EQ.1) RL=PT*SINA                                              VS  3027
      IF(RL.LT.1.E-5) RL=0.1                                               VS  3028
      IF(LAT.NE.0) CALL LATERL(GAMMA,AW,CA,LAT,LPANEL,LPAN1,DF,NAL,        VS  3029
     1YBREAK,DSIN,DCOS,IWING,IWGLT,NPP,ALP,GAMP,GAMB,GAMR,CP,GAMX,BREAK,   VS  3030
     2CHORDT,YCN,SNALP,CNALP,DZY,NLEF,NC1,SWPP,IBLC,CFF,IV,ICAM,ICAMB,     VS  3031
     3 KT,RC,SE,ICAMT,NVL1,NVL2,DMM,ZZCP,MZ,NAUG)                          VS  3032
      DO 5 I=1,LWF                                                         VS  3033
    5 SCH(I)=GAMMA(I)                                                      VS  3034
      IF(LAT.NE.(-1)) GO TO 1350                                           VS  3035
      DO 1351 I=1,NCS                                                      VS  3036
 1351 GAMP(I)=CD(I)                                                        VS  3037
 1350 CONTINUE                                                             VS  3038
      IF(LAT.EQ.(-1)) GO TO 117                                            VS  3039
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      DO 118 I=1,LWF                                                    VS  3040
  118 SCH(I)=0.                                                         VS  3041
  117 CONTINUE                                                          VS  3042
      LATT=LAT                                                          VS  3043
      IF(NASYM.EQ.1.AND.LAT.NE.1) LAT=-1                                VS  3044
      DO 914 I=1,NCS                                                    VS  3045
      CT(I)=ABS(CT(I))                                                  VS  3046
  914 CL(I)=DMM(I)                                                      VS  3047
      RETURN                                                            VS  3048
      END                                                               VS  3049
C      FORTRAN NLSTIN                                                   VS  3050
      SUBROUTINE THRUST (LPANEL,GAMMA,SNALP,LPAN1,ICAM,ICAMB,NLEF,NAL,  VS  3051
     1IV,IWING,YK,DC,DS,CSU,IWGLT,KZ,P,BK,RL,CNALP,FLP,NC1,KT,RC,ICAMT,  VS  3052
     2 SWPP,IBLC,GAM,BREAK)                                             VS  3053
C     TO CALCULATE L.E. THRUST                                          VS  3054
      DIMENSION SWPP(6,1),GAM(1),AW(50),BW(50),BREAK(6,1)               VS  3055
      DIMENSION GAMMA(1),SNALP(1),YK(6,1),DC(6,1),DS(6,1),CSU(1)        VS  3056
      DIMENSION CNALP(1),FLP(6,1),RC(6,1),ICAMT(1)                      VS  3057
      DIMENSION ICAM(1),NLEF(1),NAL(1),IV(1),IWING(1),IWGLT(1),LPAN1(1) VS  3058
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  3059
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  3060
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  3061
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                    VS  3062
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  3063
     1NFP(6),NW(6,2)                                                    VS  3064
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT, VS  3065
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)            VS  3066
      COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  3067
     1XLL(41)                                                           VS  3068
      COMMON /INOUT/ INPT,JPT                                           VS  3069
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS  3070
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,XU   VS  3071
      NASYM=YCON(50)                                                    VS  3072
      XREF=CL(50)                                                       VS  3073
      GRO=0.                                                            VS  3074
      IF(KZ.NE.10) GO TO 41                                             VS  3075
      XD=SLOPE(15)                                                      VS  3076
      YD=SLOPE(14)                                                      VS  3077
      ZD=SLOPE(13)                                                      VS  3078
      GM=SLOPE(12)                                                      VS  3079
   41 CONTINUE                                                          VS  3080
      IF(KZ.EQ.1) CFF=PSI(29)                                           VS  3081
      FPC=0.                                                            VS  3082
      IF(KZ.EQ.1) FPC=2.2*SQRT(CFF)                                     VS  3083
      NL=1                                                              VS  3084
      LG=1                                                              VS  3085
      IF (NGRD .EQ. 1) LG=2                                             VS  3086
      B1=B                                                              VS  3087
      PI=3.14159265                                                     VS  3088
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      ZB=0.                                                              VS  3089
      YB=BREAK(1,1)                                                      VS  3090
      YBB=BREAK(1,1)                                                     VS  3091
      IF(NASYM.EQ.0) GO TO 71                                            VS  3092
      YB=YK(1,NC1)                                                       VS  3093
      YBB=YB                                                             VS  3094
      IF(NC1.EQ.1) GO TO 71                                              VS  3095
      NC11=NC1-1                                                         VS  3096
      DO 72 I=1,NC11                                                     VS  3097
      ZB=ZB+(YK(1,I)-YK(1,I+1))*DS(1,I+1)                                VS  3098
   72 YBB=YBB+(YK(1,I)-YK(1,I+1))*DC(1,I+1)                              VS  3099
      YB=YK(1,1)                                                         VS  3100
   71 CONTINUE                                                           VS  3101
      IPM=1                                                              VS  3102
      L=1                                                                VS  3103
      KM=1                                                               VS  3104
      KP=1                                                               VS  3105
      DO 1 I=1,NCS                                                       VS  3106
      CN=NW(L,1)                                                         VS  3107
      CS=DC(L,IPM)                                                       VS  3108
      SS=DS(L,IPM)                                                       VS  3109
      JZ=2                                                               VS  3110
      NZ=1                                                               VS  3111
      IF (NLEF(L).EQ.1) JZ=1                                             VS  3112
      IF (NLEF(L).EQ.1) NZ=2                                             VS  3113
      K=1                                                                VS  3114
      FCOS=COS(SWEEP(KM))                                                VS  3115
      FTAN=SIN(SWEEP(KM))/FCOS                                           VS  3116
      TSW=FTAN                                                           VS  3117
      CST=CS                                                             VS  3118
      IF (NW(L,2).EQ.0) GO TO 50                                         VS  3119
      IF(L.EQ.1) I1=KM+NS(L)                                             VS  3120
      IF(L.GT.1) I1=KM+NS(L)-NS(L-1)                                     VS  3121
      CHL=CH(KM)+CH(I1)                                                  VS  3122
      GO TO 51                                                           VS  3123
   50 CHL=CH(KM)                                                         VS  3124
   51 CONTINUE                                                           VS  3125
      SRT=SQRT(CH(KM)/CHL)                                               VS  3126
      BB=B                                                               VS  3127
      IZ=1                                                               VS  3128
      IW=1                                                               VS  3129
      MM=0                                                               VS  3130
      NM=NW(K,1)                                                         VS  3131
      A=0.                                                               VS  3132
      BM=0.                                                              VS  3133
      KCH=KM                                                             VS  3134
      IP=1                                                               VS  3135
      IF (KF .EQ. 0) GO TO 90                                            VS  3136
      XO=XLE(KCH)                                                        VS  3137
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      YO=YBB+(YLE(KCH)-YB)*CS                                          VS  3138
      ZO=ZCP(KP)+ZB+(YLF(KCH)-YB)*SS                                   VS  3139
      CALL UNWF(B,XO,YO,ZO,AW,BW,CS,SS)                                VS  3140
      DO 91 IO=1,NTL                                                   VS  3141
      IX=IO+LPANEL                                                     VS  3142
      IF(KZ.NE.0) GO TO 95                                             VS  3143
      A=A+AW(IO)*GAMMA(IX)*8.                                          VS  3144
      GO TO 91                                                         VS  3145
   95 A=A+BW(IO)*GAMMA(IX)*8.                                          VS  3146
   91 CONTINUE                                                         VS  3147
   90 CONTINUE                                                         VS  3148
      ZA=0.                                                            VS  3149
      YA=BREAK(K,1)                                                    VS  3150
      YAA=BREAK(K,1)                                                   VS  3151
      IF(NASYM.EQ.0) GO TO 73                                          VS  3152
      YA=YK(K,NC1)                                                     VS  3153
      YAA=YA                                                           VS  3154
      IF(NC1.EQ.1) GO TO 73                                            VS  3155
      NC11=NC1-1                                                       VS  3156
      DO 74 J=1,NC11                                                   VS  3157
      ZA=ZA+(YK(K,J)-YK(K,J+1))*DS(K,J+1)                              VS  3158
   74 YAA=YAA+(YK(K,J)-YK(K,J+1))*DC(K,J+1)                            VS  3159
      YA=YK(K,1)                                                       VS  3160
   73 CONTINUE                                                         VS  3161
      YAP=YA                                                           VS  3162
      YAAP=YAA                                                         VS  3163
      IPN=1                                                            VS  3164
  200 FORMAT (5(6X,I4))                                                VS  3165
      DO 30 NN=1,LPANEL                                                VS  3166
      ISN=1                                                            VS  3167
      ND=NW(K,1)                                                       VS  3168
      COSD=DC(K,IPN)                                                   VS  3169
      SIND=DS(K,IPN)                                                   VS  3170
      J=NN-MM                                                          VS  3171
      IF(NN.GT.LPAN1(K).AND.NN.LE.LPN(K)) GO TO 21                     VS  3172
      GO TO 22                                                         VS  3173
   21 ND=NW(K,2)                                                       VS  3174
      IF (NN .GT. LPAN1(K).AND.NN.LE.LPN(K)) ISN=2                     VS  3175
   22 CONTINUE                                                         VS  3176
      FN=ND                                                            VS  3177
      NK=ND                                                            VS  3178
      IF(NN.GE.LPAN1(K).AND.NN.LT.LPN(K)) NK=NW(K,2)                   VS  3179
      IF(NN.EQ.LPN(K).AND.NN.LT.LPANEL) NK=NW(K+1,1)                   VS  3180
      X1=XN(NN,1)-XLE(KCH)                                             VS  3181
      X2=XN(NN,2)-XLE(KCH)                                             VS  3182
      X12=XN(NN,2)-XN(NN,1)                                            VS  3183
      ISM=2                                                            VS  3184
      FC=1.                                                            VS  3185
      IF (IV(K).EQ.1) ISM=1                                            VS  3186
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      IF(NASYM.EQ.1) ISM=1                                                  VS  3187
      DO 35 LM=1,ISM                                                        VS  3188
      IF(KZ.NE.0.AND.LM.EQ.2) FC=-1.                                        VS  3189
      IF(KZ.EQ.10) FC=1.                                                    VS  3190
      IF(LM.EQ.1) GO TO 36                                                  VS  3191
      N1=1                                                                  VS  3192
      GO TO 37                                                              VS  3193
   36 N1=2                                                                  VS  3194
   37 CONTINUE                                                              VS  3195
      DO 35 KK=1,LG                                                         VS  3196
      IF(ABS(CS-COSD).GT.0.001) GO TO 31                                    VS  3197
      IF(ABS(SS-SIND).GT.0.001) GO TO 31                                    VS  3198
      IF(NC(K).GT.1) GO TO 31                                               VS  3199
      IF(LM.EQ.1.AND.KK.EQ.1) GO TO 40                                      VS  3200
   31 CONTINUE                                                              VS  3201
      PS=SIND                                                               VS  3202
      PC=COSD                                                               VS  3203
      OS=SS                                                                 VS  3204
      QC=CS                                                                 VS  3205
      GO TO 45                                                              VS  3206
   40 PS=0.                                                                 VS  3207
      PC=1.                                                                 VS  3208
      OS=0.                                                                 VS  3209
      QC=1.                                                                 VS  3210
   45 CONTINUE                                                              VS  3211
      Y12=YN(NN,2)-YN(NN,1)                                                 VS  3212
      Z12=ZN(NN,2)-ZN(NN,1)+Y12*PS                                          VS  3213
      Y12=Y12*PC                                                            VS  3214
      YC=(-1.)**N1*(YBB+(YLE(KCH)-YB)*QC)                                   VS  3215
      Y1=YAA+(YN(NN,1)-YA)*PC-YC                                            VS  3216
      Y2=YAA+(YN(NN,2)-YA)*PC-YC                                            VS  3217
      XYK=X1*Y12-Y1*X12                                                     VS  3218
      IF (KK .EQ. 1) GO TO 18                                               VS  3219
      ZC=-2.*(ZCP(KP)+ZB+(YLE(KCH)-YB)*QS+HEIGHT)+ZCP(KP)+ZB+(YLE(KCH)-     VS  3220
     1YB)*QS                                                                VS  3221
      GE=-1.                                                                VS  3222
      FCON=1.                                                               VS  3223
      GO TO 19                                                              VS  3224
   18 ZC=ZCP(KP)+ZB+(YLE(KCH)-YB)*QS                                        VS  3225
      GE=1.                                                                 VS  3226
      FCON=0.                                                               VS  3227
   19 Z1=ZN(NN,1)-ZC+ZA+(YN(NN,1)-YA)*PS                                    VS  3228
      Z2=ZN(NN,2)-ZC+ZA+(YN(NN,2)-YA)*PS                                    VS  3229
      XZJ=X1*Z12-Z1*X12                                                     VS  3230
      UCOM=-Z1*Y12*(-ATT)*FCON                                              VS  3231
      YZI=Y1*Z12-Z1*Y12                                                     VS  3232
      ALB1=XYK*XYK+XZJ*XZJ+B1*YZI*YZI                                       VS  3233
      R1B1=SQRT(X1*X1+B1*Y1*Y1+B1*Z1*Z1)                                    VS  3234
      R2B1=SQRT(X2*X2+B1*Y2*Y2+B1*Z2*Z2)                                    VS  3235
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      UUB1=(X2*X12+B1*Y2*Y12+B1*Z2*Z12)/R2B1-(X1*X12+B1*Y1*Y12+B1*Z1*Z12VS   3236
     1)/R1B1                                                          VS   3237
      G1B1=(1.-X1/R1B1)/(Y1*Y1+Z1*Z1)                                 VS   3238
      G2B1=(1.-X2/R2B1)/(Y2*Y2+Z2*Z2)                                 VS   3239
      F1=UUB1*(UCOM+XYK)*GE/ALB1                                      VS   3240
      F2=(-Y2*G2B1+Y1*G1B1)*GE                                        VS   3241
      F3=-XZJ*UUB1/ALB1*(-1.)**N1                                     VS   3242
      F4=(Z2*G2B1-Z1*G1B1)*(-1.)**N1                                  VS   3243
      IF(KZ.NE.0.AND.IV(K).EQ.0) GO TO 14                             VS   3244
      IF(KF.EQ.0) GO TO 14                                            VS   3245
      IF(IP.NE.1) GO TO 14                                            VS   3246
      F2=-Y2*G2B1*GE                                                  VS   3247
      F4=Z2*G2B1*(-1.)**N1                                            VS   3248
   14 CONTINUE                                                        VS   3249
      AP=((F1+F2)*QC-(F3+F4)*QS)*SN(K,J,ISN)*GAMMA(NN)*CH(IZ)/FN*FC   VS   3250
      BP=((F1+F2)*QC-(F3+F4)*QS)*SN(K,J,ISN)*GAM(NN)*CH(IZ)/FN*FC     VS   3251
      BM=BM+BP                                                        VS   3252
      A=A+AP                                                          VS   3253
   35 CONTINUE                                                        VS   3254
      IF(NN.LT.NM) GO TO 16                                           VS   3255
      IF(NN.EQ.LPANEL) GO TO 30                                       VS   3256
      IW=IW+1                                                         VS   3257
      IZ=IZ+1                                                         VS   3258
      IP=IP+1                                                         VS   3259
      MM=NM                                                           VS   3260
      NM=NM+NK                                                        VS   3261
      IF(IWING(K).NE.0.AND.IW.EQ.(IWING(K)+1)) GO TO 17               VS   3262
      IF(NN.EQ.LPAN1(K).OR.NN.EQ.LPN(K)) GO TO 10                     VS   3263
      IF(YLE(IZ).LT.YK(K,IPN)) GO TO 16                               VS   3264
   17 CONTINUE                                                        VS   3265
      NJ=0                                                            VS   3266
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NJ=1                              VS   3267
      IF(NJ.EQ.1) IPN=IPN+1                                           VS   3268
      ZA=ZA+(YK(K,IPN)-YA)*DS(K,IPN)                                  VS   3269
      YAA=YAA+(YK(K,IPN)-YA)*DC(K,IPN)                                VS   3270
      YA=YK(K,IPN)                                                    VS   3271
      IF(IWING(K).NE.0 .AND. IW .EQ. (IWING(K)+1)) GO TO 23           VS   3272
      GO TO 24                                                        VS   3273
   23 IF (IWGLT(K).EQ.1) GO TO 24                                     VS   3274
   10 ZA=0.                                                           VS   3275
      YA=BREAK(K,1)                                                   VS   3276
      YAA=BREAK(K,1)                                                  VS   3277
      IF(NASYM.EQ.1.AND.NN.EQ.LPAN1(K)) YA=YAP                        VS   3278
      IF(NASYM.EQ.1.AND.NN.EQ.LPAN1(K)) YAA=YAAP                      VS   3279
      IF(NN.EQ.LPN(K).AND.K.LT.6) YA=BREAK(K+1,1)                     VS   3280
      IF(NN.EQ.LPN(K).AND.K.LT.6) YAA=BREAK(K+1,1)                    VS   3281
      IF(NN.EQ.LPAN1(K).OR.NN.EQ.LPN(K)) GO TO 24                     VS   3282
      IF (IWGLT(K).NE.2) GO TO 24                                     VS   3283
      ZA=YK(K,NC(K)-2)*DS(K,1)                                        VS   3284
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      YAA=YK(K,NC(K)-2)*DC(K,1)                                          VS  3285
      YA=YK(K,NC(K)-2)                                                   VS  3286
   24 CONTINUE                                                           VS  3287
      IF(NJ.NE.1) IPN=IPN+1                                              VS  3288
      IF (NN .EQ. LPAN1(K) .OR. NN .EQ. LPN(K)) IPN=1                    VS  3289
                                                                         VS  3290
   16 KH=0                                                               VS  3291
      IF(NN.EQ.LPAN1(K).AND.NN.NE.LPN(K)) KH=1                           VS  3292
      IF(KH.EQ.1.AND.K.EQ.1) IW=IW-NS(K)                                 VS  3293
      IF(KH.EQ.1.AND.K.GT.1) IW=IW-NS(K)+NS(K-1)                         VS  3294
      IF(NN.EQ.LPAN1(K)) IP=1                                            VS  3295
      IF(NN.EQ.LPN(K)) IP=1                                              VS  3296
   30 IF(NN.EQ.LPN(K)) K=K+1                                             VS  3297
      IF(KZ.NE.0) GO TO 61                                               VS  3298
      IF (IALP .EQ. 1) GO TO 65                                          VS  3299
      XC=0.                                                              VS  3300
      IF(ICAM(L).EQ.3) XC=XLE(KM)                                        VS  3301
      IF(IWING(L).NE.0.AND.I.GT.IWING(L)) GO TO 68                       VS  3302
      IF(L.EQ.1 .AND. ICAMB.EQ.1) GO TO 70                               VS  3303
      CALL ZCR(XC,YLE(KM),CAM,ICAM,XC,L,1,CHL,DZDY,IST,TSW)              VS  3304
      IF (NLEF(L).EQ.0) GO TO 62                                         VS  3305
      IF (KP.GE.MJW1(L,JZ,NL).AND.KP.LE.MJW2(L,JZ,NL)) GO TO 60          VS  3306
      GO TO 62                                                           VS  3307
   60 CAM=CAM+FLP(L,NL)                                                  VS  3308
      GO TO 62                                                           VS  3309
   70 YC=YLE(KM)                                                         VS  3310
      XC=XLE(KM)                                                         VS  3311
      CALL ZCDX(XC,YC,CAM,DZDY)                                          VS  3312
   62 ALPT=SNALP(I)                                                      VS  3313
      GO TO 63                                                           VS  3314
   65 CAM=0.                                                             VS  3315
      ALPT=1.                                                            VS  3316
      GO TO 63                                                           VS  3317
   68 CAM=0.                                                             VS  3318
      ALPT=SNALP(I)                                                      VS  3319
      IF(ICAMT(L).EQ.0) GO TO 63                                         VS  3320
      ICT=ICAMT(L)                                                       VS  3321
      CALL ZCR(XC,YLE(KM),CAM,ICAM,XC,L,ICT,CHL,DZDY,IST,TSW)            VS  3322
      IF(NLEF(L).EQ.0) GO TO 63                                          VS  3323
      IF(KP.GE.MJW1(L,JZ,NL).AND.KP.LE.MJW2(L,JZ,NL)) GO TO 4            VS  3324
      GO TO 63                                                           VS  3325
    4 CAM=CAM+FLP(L,NL)                                                  VS  3326
      GO TO 63                                                           VS  3327
   61 ZC=ZCP(KP)+ZB+(YLE(KM)-YB)*DS(L,IPM)                               VS  3328
      YC=YBB+(YLE(KM)-YB)*DC(L,IPM)                                      VS  3329
      XC=XLE(KM)                                                         VS  3330
      DSS=DS(L,IPM)                                                      VS  3331
      DCC=DC(L,IPM)                                                      VS  3332
      IF(KZ.EQ.10) GO TO 52                                              VS  3333
      IF(KZ.EQ.1) GO TO 64
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                                                                      VS  3334
      ALPT=0.                                                         VS  3335
      CST=1.                                                          VS  3336
      CAM=0.                                                          VS  3337
      IF (NLEF(L).EQ.0) GO TO 63                                      VS  3338
      IF (KP.GE.MJW1(L,JZ,NAL(L)).AND.KP.LE.MJW2(L,JZ,NAL(L))) CAM=FLP VS  3339
     1(L,NAL(L))                                                      VS  3340
      IF(NL.EQ.NAL(L).AND.MJW2(L,2,NAL(L)).EQ.0) CAM=FLP(L,NAL(L))    VS  3341
      GO TO 63                                                        VS  3342
   64 CONTINUE                                                        VS  3343
      WBT=0.                                                          VS  3344
      BX=ABS(BK)                                                      VS  3345
      RX=ABS(RL)                                                      VS  3346
      CSK=SWPP(L,IPM)                                                 VS  3347
      PR=P                                                            VS  3348
      NSS=NCS                                                         VS  3349
      IF(IBLC.EQ.1) PR=P*(1.-CSK*FPC)                                 VS  3350
      IF(BX.GT.0.001 .OR. RX.GT.0.001) CALL WBETA(XC,YC,ZC,WBT,DSS,DCC, VS  3351
     1BK,RL,HALFB,XLL,XTT,NSS,IV,IWING,YK,IWGLT,NASYM,NC1,DS,DC,L,BREAK)VS  3352
      ALPT=PR*(ZC*DS(L,IPM)+YC*DC(L,IPM))/HALFB(1)+BK*DS(L,IPM)-RL*(XLE(VS  3353
     1KM) -XREF)/HALFB(1)*DS(L,IPM)+WBT                               VS  3354
      CAM=0.                                                          VS  3355
      CST=1.                                                          VS  3356
   63 CONTINUE                                                        VS  3357
      WN=0.                                                           VS  3358
      IF (KF .EQ. 0) GO TO 93                                         VS  3359
      WK=0.                                                           VS  3360
      G=0.                                                            VS  3361
      IF (BK .GT. 0.01) G=GBO                                         VS  3362
      MP=1                                                            VS  3363
      IF(KZ.EQ.0) MP=0                                                VS  3364
      CALL FUSVOL(B,XO,YO,ZO,WN,WK,G,1,MP,CS,SS)                      VS  3365
   93 CONTINUE                                                        VS  3366
      IF(KZ.EQ.0) X(15,I)=ALPT*CST-CAM*CNALP(I)+WN                    VS  3367
      A=A/8.+ALPT*CST-CAM*CNALP(I)+WN                                 VS  3368
      BM=BM/8.+ALPT*CST+WN                                            VS  3369
      GO TO 53                                                        VS  3370
   52 AA=0.                                                           VS  3371
      DO 56 J=1,2                                                     VS  3372
      IF(J.EQ.2) YC=-YC                                               VS  3373
      W=VLCTY(XC,YC,ZC,XD,YD,ZD,GM,B)                                 VS  3374
   56 AA=AA+W                                                         VS  3375
      W=AA                                                            VS  3376
      CL(I)=W                                                         VS  3377
      A=A/8.+W                                                        VS  3378
   53 CONTINUE                                                        VS  3379
      A=A*SRT                                                         VS  3380
      BM=BM*SRT                                                       VS  3381
      TT=SQRT(FTAN*FTAN+BB)                                           VS  3382
      THRT1=A/(CN*TT)
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      T1=BM/(CN*TT)                                                     VS  3383
      IF(KZ.EQ.10) GO TO 54                                             VS  3384
      AL1=0.                                                            VS  3385
      IF(ABS(T1).GT.0.) AL1=(THRT1/T1-1.)*ALPT                          VS  3386
      IF(ICAM(L).EQ.0) AL1=0.                                           VS  3387
      CD(I)=THRT1                                                       VS  3388
      IF(KZ.NE.0) GO TO 69                                              VS  3389
      X(12,I)=0.5*PI*SQRT(1.-AM*AM*FCOS*FCOS)/FCOS                      VS  3390
      CT(I)=X(12,I)*THRT1*THRT1                                         VS  3391
      FCC=1.                                                            VS  3392
      IF(T1 .LT. 0.) FCC=-1.                                            VS  3393
      CL(I)=X(12,I)*T1*T1*FCC                                           VS  3394
      CU=CT(I)                                                          VS  3395
      CM(I)=0.                                                          VS  3396
      GO TO 55                                                          VS  3397
   54 CU=PI/2.*SQRT(1.-AM*AM*FCOS*FCOS)*THRT1*THRT1/FCOS                VS  3398
   55 CONTINUE                                                          VS  3399
      IF(KT.EQ.0) GO TO 75                                              VS  3400
      IF(KZ.EQ.10) GO TO 75                                             VS  3401
      IF (ICNLE(L).EQ.0) ROC=RC(L,1)                                    VS  3402
      IF (ICNLE(L).EQ.1) ROC=RC(L,1)/CHL                                VS  3403
      IF (ICNLE(L).EQ.2) ROC=RC(L,I)                                    VS  3404
      ST=SQRT(1.-AM*AM*FCOS*FCOS)                                       VS  3405
      BX=ALPT*CST+AL1                                                   VS  3406
      BY=0.                                                             VS  3407
      AS=PI/2.                                                          VS  3408
      BXX=ALPT*CST                                                      VS  3409
      BYY=0.                                                            VS  3410
      ASS=0.5*PI                                                        VS  3411
      IF(ABS(THRT1).GT.0.) BY=BX*SQRT(2.*ROC)*FCOS/(ST*THRT1)           VS  3412
      BYX=BY                                                            VS  3413
      BY=BY-AL1                                                         VS  3414
      AS2=0.5*PI                                                        VS  3415
      BY2=-BYX-AL1                                                      VS  3416
      IF(ABS(BY2).LT.1.) AS2=ATAN(BY2/SQRT(1.-BY2*BY2))                 VS  3417
      ASS2=0.5*PI                                                       VS  3418
      BYY2=-BYY                                                         VS  3419
      IF(ABS(BYY2).LT.1.) ASS2=ATAN(BYY2/SQRT(1.-BYY2*BYY2))            VS  3420
      IF(ABS(BY).LT.1.) AS=ATAN(BY/SQRT(1.-BY*BY))                      VS  3421
      IF(ABS(T1).GT.0.) BYY=BXX*SQRT(2.*ROC)*FCOS/(ST*T1)               VS  3422
      IF(ABS(BYY).LT.1.) ASS=ATAN(BYY/SQRT(1.-BYY*BYY))                 VS  3423
      C3=THRT1                                                          VS  3424
  101 FORMAT (6X,I4,6F10.5)                                             VS  3425
      A1=0.                                                             VS  3426
      A2=ATAN(ALPT/CNALP(I))                                            VS  3427
      ALSS=A2-ASS                                                       VS  3428
      A33=SIN(ALSS)                                                     VS  3429
      A11=0.                                                            VS  3430
      IF(ABS(ALPT).GT.1.E-6.AND.A2.GT.ASS) A11=T1*A33/ALPT              VS  3431
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      IF(ABS(ALPT).GT.1.E-6.AND.A2.LT.ASS2) A11=T1*SIN(A2-ASS2)/ALPT     VS  3432
      ALS=A2-AS                                                         VS  3433
      A3=SIN(ALS)+AL1                                                   VS  3434
      ALP1=ALPT+AL1                                                     VS  3435
      IF(ABS(ALP1).GT.1.E-6.AND.A2.GT.AS) A1=THRT1*A3/ALP1              VS  3436
      IF(ABS(ALP1).GT.1.E-6.AND.A2.LT.AS2) A1=THRT1*(SIN(A2-AS2)+AL1)   VS  3437
     1/ALP1                                                             VS  3438
      THRT1=A1                                                          VS  3439
      T1=A11                                                            VS  3440
      FCR=1.                                                            VS  3441
      IF(T1.LT.0.) FCR=-1.                                              VS  3442
      CL(I)=0.5*PI*ST*T1*T1/FCOS*FCR                                    VS  3443
      CD(I)=THRT1                                                       VS  3444
      CU=PI/2.*ST*THRT1*THRT1/FCOS                                      VS  3445
      CM(I)=PI*ROC*FCOS/ST                                              VS  3446
      BO=AS2*180./PI                                                    VS  3447
      AO=AS*180./PI                                                     VS  3448
C     WRITE(JPT,101) I,BO,AO,C3,THRT1,AL1,CU                            VS  3449
   75 CONTINUE                                                          VS  3450
      CD(I)=THRT1                                                       VS  3451
      FCR=1.                                                            VS  3452
      IF(THRT1.LT.0.) FCR=-1.                                           VS  3453
      CSU(I)=CU*FCR                                                     VS  3454
   69 CONTINUE                                                          VS  3455
      KM=KM+1                                                           VS  3456
      KP=KP+NW(L,1)                                                     VS  3457
      IF(I.NE.NS(L)) GO TO 80                                           VS  3458
      IF(NW(L,2).EQ.0) GO TO 80                                         VS  3459
      IF(L.EQ.1) GO TO 81                                               VS  3460
      KM=KM+NS(L)-NS(L-1)                                               VS  3461
      KP=KP+(NS(L)-NS(L-1))*NW(L,2)                                     VS  3462
      GO TO 80                                                          VS  3463
   81 KM=KM+NS(L)                                                       VS  3464
      KP=KP+NS(L)*NW(L,2)                                               VS  3465
   80 CONTINUE                                                          VS  3466
      IF ((KP+NW(L,1)).GT.MJW2(L,JZ,NL)) NL=NL+1                        VS  3467
      IF(I.EQ.NS(L)) NL=1                                               VS  3468
      IF (IWING(L).NE.0.AND.I.EQ.IWING(L)) GO TO 2                      VS  3469
      IF(I.EQ.NCS) GO TO 1                                              VS  3470
      IF(I.EQ.NS(L)) GO TO 2                                            VS  3471
      IF(YLE(KM).LT.YK(L,IPM)) GO TO 1                                  VS  3472
    2 CONTINUE                                                          VS  3473
      NI=0                                                              VS  3474
      IF(NASYM.EQ.1.AND.IPM.LT.NC1) NI=1                                VS  3475
      IF(NI.EQ.1) IPM=IPM+1                                             VS  3476
      ZB=ZB+(YK(L,IPM)-YB)*DS(L,IPM)                                    VS  3477
      YBB=YBB+(YK(L,IPM)-YB)*DC(L,IPM)                                  VS  3478
      YB=YK(L,IPM)                                                      VS  3479
      IF (IWING(L).NE.0.AND.I.EQ.IWING(L)) GO TO 25                     VS  3480
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      IF(I.EQ.NS(L)) GO TO 25                                          VS  3481
      GO TO 26                                                         VS  3482
   25 IF (IWGLT(L).EQ.1) GO TO 26                                      VS  3483
      ZB=0.                                                            VS  3484
      YB=BREAK(L,1)                                                    VS  3485
      YBB=BREAK(L+1,1)                                                 VS  3486
      IF(I.EQ.NS(L).AND.L.LT.6) YB=BREAK(L+1,1)                        VS  3487
      IF(I.EQ.NS(L).AND.L.LT.6) YBB=BREAK(L+1,1)                       VS  3488
      IF(I.EQ.NS(L)) GO TO 26                                          VS  3489
      IF (IWGLT(L).NE.2) GO TO 26                                      VS  3490
      ZB=YK(L,NC(L)-2)*DS(L,1)                                         VS  3491
      YBB=YK(L,NC(L)-2)*DC(L,1)                                        VS  3492
      YB=YK(L,NC(L)-2)                                                 VS  3493
   26 CONTINUE                                                         VS  3494
      IF(NI.NE.1) IPM=IPM+1                                            VS  3495
      KQ=KP+NW(L,1)-1                                                  VS  3496
      IF(KQ.EQ.LPAN1(L).OR.KQ.EQ.LPN(L)) IPM=1                         VS  3497
      IF(I.EQ.NS(L)) IPM=1                                             VS  3498
    1 IF(I.EQ.NS(L)) L=L+1                                             VS  3499
C     WRITE(JPT,11) (CD(J),J=1,NCS)                                    VS  3500
C     IF(KZ.EQ.10) WRITE(JPT,11) XD,YD,ZD,GM                           VS  3501
C     IF(KZ.EQ.10) WRITE(JPT,11) (CL(J),J=1,NCS)                       VS  3502
   11 FORMAT(8F10.5)                                                   VS  3503
      RETURN                                                           VS  3504
      END                                                              VS  3505
C      FORTRAN NLSTIN                                                  VS  3506
      SUBROUTINE GAMAX (AW,CA,LPAN1,LPANEL,GAMMA,BREAK,CHORDT,IWING    VS  3507
     1,YCN,CTIP,CTX,IWGLT,KZ,SE,IB)                                    VS  3508
C     TO CALCULATE SIDE-EDGE SUCTION AND STREAMWISE VORTEX DENSITY      VS  3509
      DIMENSION SE(3,6,1)                                              VS  3510
      DIMENSION AW(1),CA(1),GAMMA(1),BREAK(6,1),LPAN1(1),IWGLT(1),IWING(VS  3511
     11)                                                               VS  3512
      DIMENSION CTIP(6,1),G(6,15,2),CHORDT(6,1),YCN(6,1)               VS  3513
      DIMENSION A(15),F(15),THETA(15)                                  VS  3514
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  3515
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  3516
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  3517
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                   VS  3518
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  3519
     1NFP(6),NW(6,2)                                                   VS  3520
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT, VS  3521
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)           VS  3522
      COMMON /INOUT/ INPT,JPT                                          VS  3523
    7 FORMAT (1X,I4,8F10.5)                                            VS  3524
    8 FORMAT (9F10.5)                                                  VS  3525
    9 FORMAT (8I4)                                                     VS  3526
      PI=3.14159265                                                    VS  3527
      NASYM=YCON(50)                                                   VS  3528
      NSUR=CM(50)                                                      VS  3529
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      XREF=CL(50)                                                       VS  3530
      NK=0                                                              VS  3531
      MK=LPAN1(1)                                                       VS  3532
      N=1                                                               VS  3533
      DO 1 I=1,NCS                                                      VS  3534
      IPS1=IPOS(N)/10                                                   VS  3535
      IPS2=IPOS(N)-IPS1*10                                              VS  3536
      NCW=NW(N,1)+NW(N,2)                                               VS  3537
      NA=1                                                              VS  3538
      SUMI=0.                                                           VS  3539
      NWW=NW(N,1)                                                       VS  3540
      ISN=1                                                             VS  3541
      FN=NW(N,1)                                                        VS  3542
    6 N1=NWW+1                                                          VS  3543
      DO 2 J=1,NWW                                                      VS  3544
      KK=NK+J                                                           VS  3545
      IF (NA .EQ. 2) KK=MK+J                                            VS  3546
      FJ=J                                                              VS  3547
      THETA(J)=(2.*FJ-1.)*PI/(2.*FN)                                    VS  3548
      F(J)=GAMMA(KK)*SN(N,J,ISN)                                        VS  3549
    2 CONTINUE                                                          VS  3550
      THETA(N1)=PI                                                      VS  3551
      DO 3 J=1,N1                                                       VS  3552
      A(J)=0.                                                           VS  3553
      FJ=J                                                              VS  3554
      DO 4 K=1,NWW                                                      VS  3555
    4 A(J)=A(J)+F(K)*COS((FJ-1.)*THETA(K))                              VS  3556
      IF (J .EQ. 1) A(J)=A(J)/FN                                        VS  3557
      IF (J .NE. 1) A(J)=A(J)*2./FN                                     VS  3558
    3 CONTINUE                                                          VS  3559
      DO 10 K=1,N1                                                      VS  3560
      KK=NK+K                                                           VS  3561
      IF (NA .EQ. 2) KK=MK+K                                            VS  3562
      SUM=A(1)*THETA(K)                                                 VS  3563
      DO 11 J=1,NWW                                                     VS  3564
      FJ=J                                                              VS  3565
   11 SUM=SUM+A(J+1)*SIN(FJ*THETA(K))/FJ                                VS  3566
      IZ=I                                                              VS  3567
      IF (NA.EQ.2) IZ=I+NS(N)                                           VS  3568
      SUM=-0.5*CH(IZ)*SUM+SUMI                                          VS  3569
      IF (NA .EQ. 1 .AND. K .EQ. N1) GO TO 10                           VS  3570
      AW(KK)=SUM                                                        VS  3571
   10 CONTINUE                                                          VS  3572
      IF (NA .EQ. 2) GO TO 31                                           VS  3573
      IF (NCW.EQ.NW(N,1)) GO TO 31                                      VS  3574
      NWW=NW(N,2)                                                       VS  3575
      NA=NA+1                                                           VS  3576
      ISN=2                                                             VS  3577
      FN=NWW                                                            VS  3578
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```
      SUMI=SUM                                                          VS  3579
      GO TO 6                                                           VS  3580
   31 CONTINUE                                                          VS  3581
      NK=NK+NW(N,1)                                                     VS  3582
      MK=MK+NW(N,2)                                                     VS  3583
      IF(I.NE.NS(N)) GO TO 1                                            VS  3584
      NK=LPN(N)                                                         VS  3585
      MK=LPN(N)                                                         VS  3586
      IF(NS(N).NE.NCS) MK=LPAN1(N+1)                                    VS  3587
    1 IF(I.EQ.NS(N)) N=N+1                                              VS  3588
       NK1=0                                                            VS  3589
      DO 999 N=1,NSUR                                                   VS  3590
      IPS1=IPOS(N)/10                                                   VS  3591
      IPS2=IPOS(N)-IPS1*10                                              VS  3592
      NK2=LPAN1(N)                                                      VS  3593
      K2 = NC(N)                                                        VS  3594
      DO 12 I=1,K2                                                      VS  3595
      M=M1(N,I)                                                         VS  3596
      FM=M                                                              VS  3597
      MM=M-1                                                            VS  3598
      NCW=NW(N,1)+NW(N,2)                                               VS  3599
   19 DO 14 J=1,NCW                                                     VS  3600
      IF (IWING(N).NE.0.AND.I.EQ.NWING(N)) GO TO 72                     VS  3601
      IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 73                                VS  3602
      IF(I.EQ.NC(N)) GO TO 72                                           VS  3603
      GO TO 71                                                          VS  3604
   72 CONTINUE                                                          VS  3605
      IW=1                                                              VS  3606
      IPZ=1                                                             VS  3607
      IF(I.GT.NWING(N)) IW=2                                            VS  3608
      IF (I.GT.NWING(N)) IPZ=3                                          VS  3609
      GO TO 74                                                          VS  3610
   73 IW=2                                                              VS  3611
      IPZ=3                                                             VS  3612
   74 CONTINUE                                                          VS  3613
      G(N,J,IW)=0.                                                      VS  3614
      CL(J)=0.                                                          VS  3615
   71 CONTINUE                                                          VS  3616
      IK=0                                                              VS  3617
      IS=0                                                              VS  3618
      HAB=HALFB(N)                                                      VS  3619
      AA=-1.                                                            VS  3620
      BB=1.                                                             VS  3621
      FT=1.                                                             VS  3622
      BR=BREAK(N,I)                                                     VS  3623
      IF (NASYM.EQ.1.AND.BREAK(N,I).LT.0.) HAB=ABS(BREAK(N,1))          VS  3624
      IF (J.GT.NW(N,1)) GO TO 16                                        VS  3625
      NK=NK1                                                            VS  3626
      LK=0                                                              VS  3627
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      MK=NW(N,1)                                                        VS  3628
      IF (I.GT.NWING(N)) GO TO 95                                       VS  3629
      IF (IPS1 .EQ. 2) IS=1                                             VS  3630
      IF (IPS1 .EQ. 1) GO TO 90                                         VS  3631
      IF (IPS1 .EQ. 2) GO TO 91                                         VS  3632
      GO TO 17                                                          VS  3633
   95 IF (IPS2 .EQ. 1) GO TO 92                                         VS  3634
   90 HAB=HALFBH(N)                                                     VS  3635
      IF (IWGLT(N).EQ.2) HAB=WIDTH(N,I)                                 VS  3636
      IF (IWGLT(N).EQ.2) BR=0.                                          VS  3637
      GO TO 17                                                          VS  3638
   91 HAB=HALFB(N)                                                      VS  3639
      GO TO 17                                                          VS  3640
   92 HC=HALFBH(N)-HALFB(N)                                             VS  3641
      AA=HALFB(N)/HC                                                    VS  3642
      BB=HALFBH(N)/HC                                                   VS  3643
      HAB=HC                                                            VS  3644
      IK=1                                                              VS  3645
      FT=2.                                                             VS  3646
      GO TO 17                                                          VS  3647
   16 NK=NK2                                                            VS  3648
      MK=NW(N,2)                                                        VS  3649
      LK=NW(N,1)                                                        VS  3650
      JJ=J-NW(N,1)                                                      VS  3651
      IF (I.GT.NWING(N)) GO TO 96                                       VS  3652
      IF (IPS1 .EQ. 1) IS=1                                             VS  3653
      IF (IPS1 .EQ. 1) GO TO 91                                         VS  3654
      IF (IPS1 .EQ. 2) GO TO  90                                        VS  3655
      GO TO 17                                                          VS  3656
   96 IF (IPS2 .EQ. 2) GO TO  92                                        VS  3657
      GO TO 90                                                          VS  3658
   17 IF (J.EQ.1.OR.J.EQ.(NW(N,1)+1)) GO TO 98                          VS  3659
      GO TO 99                                                          VS  3660
   98 CONTINUE                                                          VS  3661
      DO 13 JP=1,MM                                                     VS  3662
      FJ=JP                                                             VS  3663
      YCON(JP)=COS(FJ*PI/FM)                                            VS  3664
      Y=.5*WIDTH(N,I)*(1.-YCON(JP))+BR                                  VS  3665
   13 PSI(JP)=SQRT((BB-Y/HAB)*(Y/HAB-AA))*FT                            VS  3666
   99 CONTINUE                                                          VS  3667
      L1=NK+J-LK                                                        VS  3668
      L2=L1+MK                                                          VS  3669
      L3=L2+MK                                                          VS  3670
      SM=0.                                                             VS  3671
      IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 46                                VS  3672
      IF (IK .EQ. 1) GO TO 46                                           VS  3673
      DO 41 LO=1,MM                                                     VS  3674
      LP=L1+(LO-1)*MK                                                   VS  3675
      AA=1.                                                             VS  3676
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      DO 42 LS=1,MM                                                     VS  3677
      LN=L1+(LS-1)*MK                                                   VS  3678
      IF (LS .EQ. LQ) GO TO 42                                          VS  3679
      AA=AA*(BREAK(N,I)-YCP(LN))/(YCP(LP)-YCP(LN))                      VS  3680
   42 CONTINUE                                                          VS  3681
   41 SM=SM+AA*AW(LP)*PSI(LQ)                                           VS  3682
      GAMAO=SM                                                          VS  3683
      GO TO 47                                                          VS  3684
   46 GAMAO=0.                                                          VS  3685
   47 CONTINUE                                                          VS  3686
      IF (IS .EQ. 1) GO TO 26                                           VS  3687
      IF (IWING(N).NE.0.AND.I.EQ.NWING(N)) GO TO 28                     VS  3688
      IF (I.EQ.NC(N)) GO TO 26                                          VS  3689
      GO TO 27
   28 IF(J.GT.NW(N,1)).AND.IPSI.EQ.2) GO TO 27
      GO TO 26
   27 CONTINUE                                                          VS  3690
      SM=0.                                                             VS  3691
      DO 43 LQ=1,MM                                                     VS  3692
      LP=L1+(LQ-1)*MK                                                   VS  3693
      AA=1.                                                             VS  3694
      DO 44 LS=1,MM                                                     VS  3695
      LN=L1+(LS-1)*MK                                                   VS  3696
      IF (LS .EQ. LQ) GO TO 44                                          VS  3697
      AA=AA*(BREAK(N,I+1)-YCP(LN))/(YCP(LP)-YCP(LN))                    VS  3698
   44 CONTINUE                                                          VS  3699
   43 SM=SM+AA*AW(LP)*PSI(LQ)                                           VS  3700
      GAMAN=SM                                                          VS  3701
      GO TO 30                                                          VS  3702
   26 GAMAN=0.                                                          VS  3703
   30 DO 18 K=1,MM                                                      VS  3704
      LL=NK+(K-1)*MK+J-LK                                               VS  3705
      TAN=(XN(LL,2)-XN(LL,1))/(YN(LL,2)-YN(LL,1))                       VS  3706
      CA(LL)=0.                                                         VS  3707
      DO 20 KK=1,MM                                                     VS  3708
      LI=NK+(KK-1)*MK+J-LK                                              VS  3709
      IF (KK .EQ. K) GO TO 22                                           VS  3710
      CA(LL)=CA(LL)+2.*(-1.)**(K+KK)*AW(LI)*PSI(KK)/(WIDTH(N,I)*(YCON(KKVS  3711
     1)-YCON(K)))                                                       VS  3712
      GO TO 20                                                          VS  3713
   22 CA(LL)=CA(LL)+AW(LL)*PSI(K)*YCON(K)/(WIDTH(N,I)*SJ(N,K,I)*SJ(N,   VS  3714
     1K,I))                                                             VS  3715
   20 CONTINUE                                                          VS  3716
      IF (IK .EQ. 0) FK=YCP(LL)/(HAB*HAB)                               VS  3717
      IF (IK.EQ.1) FK=-(1.-2.*(YCP(LL)-HALFB(N))/HAB)/(0.5*HAB)         VS  3718
      CA(LL)=CA(LL)+GAMAO*(-1.)**K/(1.-YCON(K))/WIDTH(N,I)-GAMAN*(-1.)**VS  3719
     1(M+K)/(1.+YCON(K))/WIDTH(N,I)+AW(LL)*FK/PSI(K)                    VS  3720
      CA(LL)=CA(LL)/PSI(K)                                              VS  3721
      IF (IWING(N).NE.0.AND.I.EQ.NWING(N)) GO TO 51                     VS  3722
      IF (I.EQ.NC(N)) GO TO 50                                          VS  3723
      IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 50                                VS  3724
      GO TO 18                                                          VS  3725
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51  IF(J.GT.NW(N,1).AND.IPS1.EQ.2) GO TO 18                          VS  3726
50 CONTINUE                                                          VS  3727
   IF (CHORDT(N,IPZ).LE.0.001) GO TO 18                              VS  3728
   IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 78                                VS  3729
   G(N,J,IW)=G(N,J,IW)+AW(LL)*PSI(K)*(-1.)**(K+M)/(1.+YCON(K))       VS  3730
   GO TO 18                                                          VS  3731
78 G(N,J,IW)=G(N,J,IW)+AW(LL)*PSI(K)*(-1.)**K/(1.-YCON(K))           VS  3732
18 CA(LL)=TAN*GAMMA(LL)+CA(LL)                                       VS  3733
   IF (J.EQ.NW(N,1))  NK1=LL                                         VS  3734
   IF (I.EQ.NC(N)) GO TO 23                                          VS  3735
   IF (IWING(N).NE.0.AND.I.EQ.NWING(N)) GO TO 24                     VS  3736
   IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 23                                VS  3737
   GO TO 14
24  IF(J.GT.NW(N,1).AND.IPS1.EQ.2) GO TO 14                          VS  3738
23 CONTINUE                                                          VS  3739
   IF (CHORDT(N,IPZ).LE.0.001) GO TO 14                              VS  3740
   IF(NASYM.EQ.1.AND.I.EQ.1) GO TO 76                                VS  3741
   G(N,J,IW)=2./WIDTH(N,I)*G(N,J,IW)+0.5*(-1.)**M*GAMAO/WIDTH(N,I)   VS  3742
   GO TO 77                                                          VS  3743
76 G(N,J,IW)=2./WIDTH(N,I)*G(N,J,IW)+0.5*(-1.)**M*GAMAN/WIDTH(N,I)   VS  3744
77 CONTINUE                                                          VS  3745
   IF (IK.EQ.0) G(N,J,IW)=G(N,J,IW)*SQRT(HAR)/2.828427124            VS  3746
   IF(IK.EQ.1) G(N,J,IW)=G(N,J,IW)*SQRT(HAB)/4.                      VS  3747
   IF(IW.EQ.2) DUMT(IB,N,J)=G(N,J,IW)                                VS  3748
   IF(IW.EQ.2) GO TO 14                                              VS  3749
   IF (IWING(N).NE.0) GO TO 85                                       VS  3750
86 SE(IB,N,J)=G(N,J,IW)                                              VS  3751
   GO TO 14                                                          VS  3752
85 IF (IPS1.EQ.2.AND.J.GT.NW(N,1)) GO TO 87                          VS  3753
   IF(IPS1.EQ.1) GO TO 87                                            VS  3754
   GO TO 86                                                          VS  3755
87 SE(IB,N,J)=0.
   G(N,J,IW)=0.                                                      VS  3756
14 CONTINUE                                                          VS  3757
   NK2=LL                                                            VS  3758
12 CONTINUE                                                          VS  3759
   NK1=LPN(N)                                                        VS  3760
999 CONTINUE                                                         VS  3761
   IF(KZ.NE.0) RETURN                                                VS  3762
   CTP=0.                                                            VS  3763
   CTX=0.                                                            VS  3764
   SUMM=0.                                                           VS  3765
   JP=0                                                              VS  3766
   MM=0                                                              VS  3767
   DO 1000 N=1,NSUR                                                  VS  3768
   MK=LPAN1(N)-NW(N,1)                                               VS  3769
   KCH=NS(N)+MM                                                      VS  3770
   NCW=NW(N,1)+NW(N,2)                                               VS  3771
   IW=1                                                              VS  3772
   IF(NC(N).NE.NWING(N)) IW=2                                        VS  3773
   IF(NASYM.EQ.1) IW=2                                               VS  3774
   DO 64 K=1,IW
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      CTIP(N,K)=0.                                                      VS  3775
      IPZ=1                                                             VS  3776
      IF (K .EQ. 2) IPZ=3                                               VS  3777
      IF (CHORDT(N,IPZ) .LE.0.001) GO TO 64                             VS  3778
      WRITE (JPT,66)                                                    VS  3779
      WRITE (JPT,67)                                                    VS  3780
   66 FORMAT(/50H CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT)     VS  3781
   67 FORMAT (/5X,3HX/C,6X,4HCTIP)                                      VS  3782
      CHD=CHORDT(N,IPZ)+CHORDT(N,IPZ+1)                                 VS  3783
      IF(K.EQ.2) GO TO 105                                              VS  3784
      IF(IWING(N).EQ.0) GO TO 105                                       VS  3785
      IN=KCH-NS(N)+IWING(N)                                             VS  3786
      IM=MK-(NS(N)-IWING(N))*NW(N,1)                                    VS  3787
      GO TO 106                                                         VS  3788
  105 IN=KCH                                                            VS  3789
      IM=MK                                                             VS  3790
  106 CHORD=CH(IN)                                                      VS  3791
      IF(NW(N,2).EQ.0) GO TO 107                                        VS  3792
      II=NS(N)+IN                                                       VS  3793
      IF(N.GT.1) II=NS(N)-NS(N-1)+IN                                    VS  3794
      CHORD=CHORD+CH(II)                                                VS  3795
  107 CONTINUE                                                          VS  3796
      DO 65 I=1,NCW                                                     VS  3797
      J=IM+I                                                            VS  3798
      IF(I.LE.NW(N,1)) GO TO 108                                        VS  3799
      IK=NS(N)                                                          VS  3800
      IF(N.GT.1)IK=NS(N)-NS(N-1)                                        VS  3801
      IF(IWING(N).NE.0.AND.K.EQ.1) IK=IWING(N)
      LL=LPAN1(N)+NW(N,2)*(IK-1)+I-NW(N,1)                              VS  3802
      GO TO 109                                                         VS  3803
  108 LL=J                                                              VS  3804
  109 CONTINUE                                                          VS  3805
      XC=(XV(LL)-XLE(IN))/CHORD                                         VS  3806
      CTDIS=0.                                                          VS  3807
      IF (K .EQ. 2) GO TO 80                                            VS  3808
      IF (IPS1 .EQ. 2 .AND. I .GT. NW(N,1)) GO TO 65                    VS  3809
      IF (IPS1 .EQ. 1) GO TO 65                                         VS  3810
   80 CONTINUE                                                          VS  3811
      CTDIS=2.*PI*G(N,I,K)*G(N,I,K)/CHD                                 VS  3812
   65 WRITE (JPT,8) XC,CTDIS                                            VS  3813
      SUM=0.                                                            VS  3814
      ISN=1                                                             VS  3815
      FN=NW(N,1)                                                        VS  3816
      CHD=CHORDT(N,IP7)                                                 VS  3817
      DO 61 I=1,NCW                                                     VS  3818
      FCR=1.                                                            VS  3819
      IF (G(N,I,K).LT.0.) FCR=-1.                                       VS  3820
      J=I                                                               VS  3821
      X1=YCN(N,IPZ)                                                     VS  3822
      IF (K .EQ. 2) GO TO 81                                            VS  3823
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      IF (IPS1 .EQ. 2 .AND. I.GT.NW(N,1)) GO TO 61                      VS  3824
      IF (IPS1 .EQ. 1) GO TO 61                                         VS  3825
   81 CONTINUE                                                          VS  3826
      IF (I.LE.NW(N,1)) GO TO 68                                        VS  3827
      ISN=2                                                             VS  3828
      FN=NW(N,2)                                                        VS  3829
      J=I-NW(N,1)                                                       VS  3830
      X1=YCN(N,IPZ+1)                                                   VS  3831
      CHD=CHORDT(N,IPZ+1)                                               VS  3832
   68 FJ = J                                                            VS  3833
      XM = X1 + 0.5*CHD*(1.-COS((2.*FJ - 1.)*PI/(2.*FN)))               VS  3834
      XM=XM-XREF                                                        VS  3835
      SUM=SUM+CHD*G(N,I,K)*G(N,I,K)*SN(N,J,ISN)*FCR/FN                  VS  3836
      SUMM=SUMM+CHD*XM*G(N,I,K)*G(N,I,K)*SN(N,J,ISN)*FCR/FN             VS  3837
   61 CONTINUE                                                          VS  3838
      CTX=SUM+CTX                                                       VS  3839
      CTIP(N,K)=SUM*PI*PI/(2.*HALFSW)                                   VS  3840
      CTP=CTP+CTIP(N,K)                                                 VS  3841
   64 CONTINUE                                                          VS  3842
      IF (CHORDT(N,1).GT.0.001.OR.CHORDT(N,3).GT.0.001) JP=JP+1         VS  3843
      IF(NW(N,2).NE.0.AND.N.EQ.1) MM=MM+NS(N)                           VS  3844
      IF(NW(N,2).NE.0.AND.N.GT.1) MM=MM+NS(N)-NS(N-1)                   VS  3845
 1000 CONTINUE                                                          VS  3846
      IF(ABS(CTX).LE.0.00001) GO TO 82                                  VS  3847
      IF (JP.NE.0) CTX=SUMM/CTX                                         VS  3848
   82 CONTINUE                                                          VS  3849
      CTX=-CTX                                                          VS  3850
      WRITE (JPT,62) CTP                                                VS  3851
   62 FORMAT (/25H TIP SUCTION COEFFICIENT=,F10.5,2X,15H(ONE SIDE ONLY))VS  3852
      WRITE(JPT,75) CTX                                                 VS  3853
   75 FORMAT(/46H THE X-COORDINATE OF CENTROID OF TIP SUCTION =,F10.5)   VS  3854
      WRITE (JPT,69)                                                    VS  3855
   69 FORMAT(/8H ELEMENT,2X,3HY/S,6X,5HGAMMA,5X,5HGAMAX)                VS  3856
      N=1                                                               VS  3857
      DO 35 I=1,LPANEL                                                  VS  3858
      ETA=YV(I)/HALFB(N)                                                VS  3859
      WRITE (JPT,7) I,ETA,AW(I),CA(I)                                   VS  3860
   35 IF(I.EQ.LPN(N)) N=N+1                                             VS  3861
      RETURN                                                            VS  3862
      END                                                               VS  3863
C      FORTRAN NLSTIN                                                   VS  3864
      SUBROUTINE AUGVOR(AW,CA,GAMMA,GM,LPANEL,X2,Y2,Z2,B2,Z7CP,XCP,YCP  VS  3865
     1,NZ)                                                              VS  3866
      DIMENSION AW(1),CA(1),GAMMA(1),ZZCP(1),XCP(1),YCP(1),W(2)         VS  3867
      REWIND 02                                                         VS  3868
    3 FORMAT (10F10.5)                                                  VS  3869
      DO 1 I=1,LPANEL                                                   VS  3870
      DO 2 K=1,2                                                        VS  3871
      F=1.                                                              VS  3872
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      IF(K.EQ.2) F=-1.                                                  VS  3873
      X=XCP(I)                                                          VS  3874
      Y=YCP(I)*F                                                        VS  3875
      Z=ZZCP(I)                                                         VS  3876
    2 W(K)=VLCTY(X,Y,Z,X2,Y2,Z2,GM,B2)                                  VS  3877
      IF(NZ.EQ.0) CA(I)=W(1)+W(2)                                       VS  3878
    1 IF(NZ.EQ.1) CA(I)=W(1)-W(2)                                       VS  3879
      IF(NZ.EQ.0) GO TO 15                                              VS  3880
      DO 16 J=1,LPANEL                                                  VS  3881
   16 READ(02) (AW(K),K=1,LPANEL)                                       VS  3882
   15 CONTINUE                                                          VS  3883
      DO 5 I=1,LPANEL                                                   VS  3884
      IF(NZ.EQ.0) GAMMA(I)=0.                                           VS  3885
      READ (02) (AW(K),K=1,LPANEL)                                      VS  3886
      DO 10 J=1,LPANEL                                                  VS  3887
   10 GAMMA(I)=GAMMA(I)-AW(J)*CA(J)                                     VS  3888
    5 CONTINUE                                                          VS  3889
      RETURN                                                            VS  3890
      END                                                               VS  3891
C      FORTRAN NLSTIN                                                   VS  3892
      SUBROUTINE SPNINT(N1,N2,NS,CSC,SJ,SWEEP,M1,X,GM,WIDTH,GW)         VS  3893
      COMMON /INOUT/ INPT,JPT                                           VS  3894
      DIMENSION NS(1),CSC(1),SJ(6,31,1),SWEEP(1),M1(6,1),X(15,1),WIDTH(6VS  3895
     1,1)                                                               VS  3896
      PI=3.14159265                                                     VS  3897
      N=NS(1)                                                           VS  3898
      GM=0.                                                             VS  3899
      GW=0.                                                             VS  3900
      KC=1                                                              VS  3901
      KLL=0                                                             VS  3902
      IF(N1.GT.1) KC=2                                                  VS  3903
      IF(N1.GT.1) KLL=N1-1                                              VS  3904
      DO 1 I=1,N                                                        VS  3905
      IF(I.GE.N1.AND.I.LE.N2) GO TO 5                                   VS  3906
      GO TO 1                                                           VS  3907
    5 KL=I-KLL                                                          VS  3908
      FM=M1(1,KC)                                                       VS  3909
      AA=SJ(1,KL,KC)/FM                                                 VS  3910
      GM=GM+CSC(I)/X(15,I)*AA                                           VS  3911
      GW=GW+CSC(I)*AA                                                   VS  3912
    1 CONTINUE                                                          VS  3913
      GM=0.25*PI*WIDTH(1,KC)*GM                                         VS  3914
      GW=GW*0.5*WIDTH(1,KC)*PI                                          VS  3915
C     WRITE(JPT,2) (X(15,I),I=1,N)                                      VS  3916
C     WRITE(JPT,2) GM,WIDTH(1,KC),GW                                    VS  3917
C     WRITE(JPT,2) (CSC(I),I=1,N)                                       VS  3918
    2 FORMAT (5X,10F10.5)                                               VS  3919
      RETURN                                                            VS  3920
      END                                                               VS  3921
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C       FORTRAN NLSTIN                                                    VS  3922
        SUBROUTINE LATERL(GAMMA,AW,CA,LAT,LPANEL,LPAN1,DF,NAL,YK,DS,DC,IWIVS  3923
       1NG,IWGLT,NALP,ALP,GAMP,GAMB,GAMR,CP,GAMX,BREAK,CHORDT,YCN,        VS  3924
       2SNALP,CNALP,DZY,NLEF,NC1,SWPP,IBLC,CFF,IV,ICAM,ICAMB,KT,RC,SE,ICAMVS  3925
       3T,NVL1,NVL2,DMM,ZZCP,MZ,NAUG)                                     VS  3926
C       TO CALCULATE THE EFFECT OF LATERAL AND DIECTIONAL MOTIONS          VS  3927
        DIMENSION NVL1(1),NVL2(1),DMM(1),ZZCP(1)                          VS  3928
        DIMENSION DZY(1),SWPP(6,1),IV(1),LPAN1(1),NAL(1),IWING(1),IWGLT(1)VS  3929
       1,NLEF(1),ICAM(1),RC(6,1),SE(3,6,1),ICAMT(1)                       VS  3930
        DIMENSION GAMMA(1),AW(1),CA(1),DF(6,1),YK(6,1),DS(6,1)            VS  3931
        DIMENSION DC(6,1),GAMP(1),GAMB(1),GAMR(1),CP(1),GAMX(1),BREAK(6,1)VS  3932
       1,CHORDT(6,1),YCN(6,1),SNALP(1),CNALP(1)                           VS  3933
        COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  3934
       1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  3935
       200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  3936
        COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),   VS  3937
       1NFP(6),NW(6,2)                                                    VS  3938
        COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  3939
       1XLL(41)                                                           VS  3940
        COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                    VS  3941
        COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),ISP(6),NGRD,HEIGHT,  VS  3942
       1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)            VS  3943
        COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS  3944
       15),DIST,PP,BKK,RLL,CFFK                                           VS  3945
        COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),   VS  3946
       1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,RDX,XU    VS  3947
        COMMON /INOUT/ INPT,JPT                                           VS  3948
        DIMENSION DUM(200),DUMY(200),DUMZ(200),DUMS(200),DUMC(200)        VS  3949
        DIMENSION DUMX(200)                                               VS  3950
        L1=LWF+1                                                          VS  3951
        NSUR=CM(50)                                                       VS  3952
        NASYM=YCON(50)                                                    VS  3953
        GMAX(50)=CL(50)                                                   VS  3954
        PI=3.14159265                                                     VS  3955
        IF(LAT.EQ.1) GO TO 30                                             VS  3956
        REWIND 01                                                         VS  3957
        READ(01) (DUM(I),I=1,LWF)                                         VS  3958
        READ(01) (AW(I),I=1,LWF)                                          VS  3959
        AW(L1)=0.                                                         VS  3960
        DO 5 I=1,LWF                                                      VS  3961
      5 GAMMA(I)=-AW(I+1)/AW(1)                                           VS  3962
        NJ=LWF-1                                                          VS  3963
        MM=NW(1,1)                                                        VS  3964
        IZ=1                                                              VS  3965
        L=1                                                               VS  3966
        DO 4 IJ=2,LWF                                                     VS  3967
        NN=NW(L,1)                                                        VS  3968
        JZ=1                                                              VS  3969
        NX=2                                                              VS  3970
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      IF (NLEF(L).EQ.1) JZ=2                                                VS  3971
      IF (NLEF(L).EQ.1) NX=1                                                VS  3972
      READ(01) (DUM(K),K=1,LWF)                                             VS  3973
      READ(01) (AW(K),K=1,LWF)                                              VS  3974
      AW(L1)=0.                                                             VS  3975
      IF(IJ.GT.LPANEL) GO TO 2                                              VS  3976
      IF(NAL(L).EQ.0) GO TO 2                                               VS  3977
      IF(IJ.GE.MJW1(L,JZ,NAL(L)).AND.IJ.LE.MJW2(L,JZ,NAL(L))) GO TO 10      VS  3978
      IF(IJ.GE.MJW1(L,NX,NAL(L)).AND.IJ.LE.MJW2(L,NX,NAL(L))) AW(L1)=DF(VS  3979
     1L,NAL(L))                                                             VS  3980
      IF (NLEF(L).EQ.1.AND.IJ.EQ.MM) AW(L1)=0.5*DF(L,NAL(L))                VS  3981
      GO TO 2                                                               VS  3982
   10 IF (IJ.EQ.MM.AND.NLEF(L).EQ.0) AW(L1)=0.5*DF(L,NAL(L))                VS  3983
      IF(NLEF(L).EQ.1) GO TO 2                                              VS  3984
      IF(MJW1(L,2,NAL(L)).EQ.0) AW(L1)=DF(L,NAL(L))                         VS  3985
    2 IK=IJ                                                                 VS  3986
      AW(L1)=AW(L1)*CNALP(IZ)                                               VS  3987
C     WRITE(JPT,15) IJ,AW(L1),CNALP(IZ)                                     VS  3988
      CALL VMSEON (NJ,IK,AW,GAMMA,CA)                                       VS  3989
      NJ=NJ-1                                                               VS  3990
      IF(IJ.GT.LPANEL) GO TO 4                                              VS  3991
      IF(IJ.GE.LPAN1(L).AND.IJ.LT.LPN(L)) NN=NW(L,2)                        VS  3992
      IF(IJ.LT.MM) GO TO 3                                                  VS  3993
      MM=MM+NN                                                              VS  3994
      IZ=IZ+1                                                               VS  3995
    3 CONTINUE                                                              VS  3996
      IF(IJ.NE.LPAN1(L)) GO TO 4                                            VS  3997
      IF(IJ.EQ.LPN(L)) GO TO 4                                              VS  3998
      IF(L.EQ.1) IZ=1                                                       VS  3999
      IF(L.GT.1) IZ=IZ-NS(L)+NS(L-1)                                        VS  4000
    4 IF (IJ.EQ.LPN(L)) L=L+1                                               VS  4001
      KZ=2                                                                  VS  4002
      CALL THRUST(LPANEL,GAMMA,SNALP,LPAN1,ICAM,ICAMB,NLEF,NAL,IV,IWING VS  4003
     1,YK,DC,DS,CA,IWGLT,KZ,0.,0.,0.,CNALP,DF,NC1,KT,RC,ICAMT,SWPP,IBLC,VS  4004
     2YCON,BREAK)                                                           VS  4005
      CALL GAMAX (AW,CA,LPAN1,LPANEL,GAMMA,BREAK,CHORDT,IWING,YCN,          VS  4006
     1SLOPE,CTX,IWGLT,KZ,SE,2)                                              VS  4007
C     WRITE(JPT,17) (CD(K),K=1,NCS)                                         VS  4008
C     WRITE(JPT,17) (SE(2,1,K),K=1,NCW)                                     VS  4009
      RETURN                                                                VS  4010
   30 KZ=1                                                                  VS  4011
      BK=0.                                                                 VS  4012
      P=PP                                                                  VS  4013
      GBO=0.                                                                VS  4014
      GRO=0.                                                                VS  4015
      FPC=2.2*SQRT(CFF)                                                     VS  4016
      XREF=CL(50)                                                           VS  4017
      RL=0.                                                                 VS  4018
      L=1                                                                   VS  4019
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      KM=1                                                              VS  4020
      DO 37 I=1,NCS                                                     VS  4021
      NWW=NW(L,1)                                                       VS  4022
      IF(NW(L,2).NE.0) NWW=NW(L,2)                                      VS  4023
      IF(L.EQ.1) IST=0                                                  VS  4024
      IF(L.NE.1 .AND. NW(L,2).EQ.0) IST=LPN(L-1)                        VS  4025
      IF(NW(L,2).NE.0) IST=LPAN1(L)                                     VS  4026
      IL=0                                                              VS  4027
      IF(L.GT.1) IL=NS(L-1)                                             VS  4028
      GMAX(I)=0.                                                        VS  4029
      MK=IST+(I-IL-1)*NWW                                               VS  4030
      IK=KM                                                             VS  4031
      IF(NW(L,2).NE.0) IK=KM+NS(L)                                      VS  4032
      DO 38 LQ=1,NWW                                                    VS  4033
      LP=MK+LQ                                                          VS  4034
      AA=1.                                                             VS  4035
      DO 39 LS=1,NWW                                                    VS  4036
      LN=MK+LS                                                          VS  4037
      IF(LS.EQ.LQ) GO TO 39                                             VS  4038
      AA=AA*(XTE(IK)-XV(LN))/(XV(LP)-XV(LN))                            VS  4039
   39 CONTINUE                                                          VS  4040
  101 FORMAT (5(6X,I4))                                                 VS  4041
   38 GMAX(I)=GMAX(I)+AA*GAMX(LP)                                       VS  4042
      KM=KM+1                                                           VS  4043
      IF(I.NE.NS(L)) GO TO 37                                           VS  4044
      IF(NW(L,2).EQ.0) GO TO 37                                         VS  4045
      IF(L.EQ.1) KM=KM+NS(L)                                            VS  4046
      IF(L.GT.1) KM=KM+NS(L)-NS(L-1)                                    VS  4047
   37 IF(I.EQ.NS(L)) L=L+1                                              VS  4048
C     WRITE(JPT,17) (GMAX(I),I=1,NCS)                                   VS  4049
      IF(MZ.EQ.0) GO TO 31                                              VS  4050
      X2=SLOPE(15)                                                      VS  4051
      Y2=SLOPE(14)                                                      VS  4052
      Z2=SLOPE(13)                                                      VS  4053
      GM=SLOPE(12)                                                      VS  4054
      GW=SLOPE(11)                                                      VS  4055
      Z2=0.                                                             VS  4056
   31 CONTINUE                                                          VS  4057
      DO 35 I=1,3                                                       VS  4058
      MM=NW(1,1)                                                        VS  4059
      IPN=1                                                             VS  4060
      IPM=0                                                             VS  4061
      IW=1                                                              VS  4062
      IL=1                                                              VS  4063
      ZB=0.                                                             VS  4064
      YB=BREAK(1,1)                                                     VS  4065
      YBB=BREAK(1,1)                                                    VS  4066
      IF(NASYM.EQ.0) GO TO 80                                           VS  4067
      YB=YK(1,NC1)                                                      VS  4068
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      YBB=YB                                                                VS  4069
      IF(NC1.EQ.1) GO TO 80                                                 VS  4070
      NC11=NC1-1                                                            VS  4071
      DO 81 J=1,NC11                                                        VS  4072
      ZB=ZB+(YK(1,J)-YK(1,J+1))*DS(1,J+1)                                   VS  4073
   81 YBB=YBB+(YK(1,J)-YK(1,J+1))*DC(1,J+1)                                 VS  4074
      YB=YK(1,1)                                                            VS  4075
   80 CONTINUE                                                              VS  4076
      YBP=YB                                                                VS  4077
      YBBP=YBB                                                              VS  4078
      IF(I.NE.1) REWIND 03                                                  VS  4079
      L=1                                                                   VS  4080
C     WRITE(JPT,102) I                                                      VS  4081
  102 FORMAT (2X,7HTESTING,I4)                                              VS  4082
      DO 6 IJ=1,LWF                                                         VS  4083
      CSK=SWPP(L,IPN)                                                       VS  4084
      IF(IJ.GT.LPANEL) GO TO 21                                             VS  4085
      NN=NW(L,1)                                                            VS  4086
      YC=YBB+(YCP(IJ)-YB)*DC(L,IPN)                                         VS  4087
      ZC=ZCP(IJ)+ZB+(YCP(IJ)-YB)*DS(L,IPN)                                  VS  4088
      XC=XCP(IJ)                                                            VS  4089
      WBT=0.                                                                VS  4090
      DSS=DS(L,IPN)                                                         VS  4091
      DCC=DC(L,IPN)                                                         VS  4092
      IF(I.NE.1) CALL WBETA(XC,YC,ZC,WBT,DSS,DCC,BK,RL,HALFB,XLL,XTT,NCSVS  4093
     1,IV,IWING,YK,IWGLT,NASYM,NC1,DS,DC,L,BREAK)                           VS  4094
      PHI=ATAN(DZY(IJ))                                                     VS  4095
      COSP=COS(PHI)                                                         VS  4096
      SINP=SIN(PHI)                                                         VS  4097
      SPHI=DS(L,IPN)*COSP+SINP*DC(L,IPN)                                    VS  4098
      PR=P                                                                  VS  4099
      IF(IBLC .EQ. 1) PR=P*(1.-CSK*FPC)                                     VS  4100
      CA(IJ)=PR*(ZC*DS(L,IPN)+YC*DC(L,IPN))/HALFB(1)+BK*SPHI-RL*(XCP(IJ)VS  4101
     1-XREF)/HALFB(1)*SPHI+WBT                                              VS  4102
      WN=0.                                                                 VS  4103
      IF(KF.EQ.0) GO TO 20                                                  VS  4104
      WK=0.                                                                 VS  4105
      G=0.                                                                  VS  4106
      CALL FUSVOL(B,XC,YC,ZC,WN,WK,G,1,1,DCC,DSS)                           VS  4107
      GO TO 20                                                              VS  4108
   21 II=IJ-LPANEL                                                         VS  4109
      CA(IJ)=0.                                                             VS  4110
      WN=0.                                                                 VS  4111
      IF(II.GT.NF) GO TO 20                                                 VS  4112
      XS=XCF(II)-XTEF                                                       VS  4113
      XB=XCF(II)-XLEF                                                       VS  4114
      IF(II.EQ.NF) RFL=0.                                                   VS  4115
      IF(II.NE.NF) RFL=XS/SQRT(XS*XS+B*RF(II)*RF(II))                       VS  4116
      RF1=XS*(1.+RFL)                                                       VS  4117
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      RFO=XB*(1.+XB/SQRT(XB*XB+B*RF(II)*RF(II)))                                VS  4118
      WN=(-BK+RL*XCF(II)/HALFB(1))*RF(II)*RF(II)-(RF1-RFO)*(GBO+RL*GRO)/VS  4119
     1(4.*PI)                                                                   VS  4120
   20 CA(IJ)=CA(IJ)+WN                                                          VS  4121
   15 FORMAT (1X,I4,2X,8F10.5)                                                  VS  4122
      IF(IJ.GT.LPANEL) GO TO 6                                                  VS  4123
      IF(I.NE.1) GO TO 11                                                       VS  4124
      DUM(IJ)=DC(L,IPN)*COSP-DS(L,IPN)*SINP                                     VS  4125
      DUMS(IJ)=SPHI                                                             VS  4126
      DUMC(IJ)=CNALP(IW)                                                        VS  4127
      DUMY(IJ)=YC                                                               VS  4128
      DUMZ(IJ)=ZC                                                               VS  4129
      DUMX(IJ)=SNALP(IW)*SPHI                                                   VS  4130
   11 CONTINUE                                                                  VS  4131
      IF (IJ .GE.LPAN1(L).AND.IJ.LT.LPN(L)) NN=NW(L,2)                          VS  4132
      IF(IJ.EQ.LPN(L).AND.IJ.LT.LPANEL) NN=NW(L+1,1)                            VS  4133
      IF (IJ.LT.MM) GO TO 8                                                     VS  4134
      MM=MM+NN                                                                  VS  4135
      IL=IL+1                                                                   VS  4136
      IW=IW+1                                                                   VS  4137
      IF (IWING(L).NE.0.AND.IW.EQ.(IWING(L)+1)) GO TO 7                         VS  4138
      IF(IJ.EQ.LPAN1(L).OR.IJ.EQ.LPN(L)) GO TO 16                               VS  4139
      IF(YLE(IL).LT.YK(L,IPN)) GO TO 8                                          VS  4140
    7 CONTINUE                                                                  VS  4141
      NI=0                                                                      VS  4142
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NI=1                                        VS  4143
      IF(NI.EQ.1) IPN=IPN+1                                                     VS  4144
      ZB=ZB+(YK(L,IPN)-YB)*DS(L,IPN)                                            VS  4145
      YBB=YBB+(YK(L,IPN)-YB)*DC(L,IPN)                                          VS  4146
      YB=YK(L,IPN)                                                              VS  4147
      IF (IWING(L).NE.0.AND.IW.EQ.(IWING(L)+1)) GO TO 22                        VS  4148
      GO TO 23                                                                  VS  4149
   22 IF (IWGLT(L).EQ.1) GO TO 23                                               VS  4150
   16 ZB=0.                                                                     VS  4151
      YB=BREAK(L,1)                                                             VS  4152
      YBB=BREAK(L,1)                                                            VS  4153
      IF(NASYM.EQ.1.AND.IJ.EQ.LPAN1(L)) YB=YBP                                  VS  4154
      IF(NASYM.EQ.1.AND.IJ.EQ.LPAN1(L)) YBB=YBBP                                VS  4155
      IF(IJ.EQ.LPN(L).AND.L.LT.6) YB=BREAK(L+1,1)                               VS  4156
      IF(IJ.EQ.LPN(L).AND.L.LT.6) YBB=BREAK(L+1,1)                              VS  4157
      IF(IJ.EQ.LPAN1(L).OR.IJ.EQ.LPN(L)) GO TO 23                               VS  4158
      IF(IWGLT(L).NE.2) GO TO 23                                                VS  4159
      ZB=YK(L,NC(L)-2)*DS(L,1)                                                  VS  4160
      YBB=YK(L,NC(L)-2)*DC(L,1)                                                 VS  4161
      YB=YK(L,NC(L)-2)                                                          VS  4162
   23 CONTINUE                                                                  VS  4163
      IF(NI.NE.1) IPN=IPN+1                                                     VS  4164
      IF (IJ.EQ. LPAN1(L).OR.IJ.EQ.LPN(L)) IPN=1                                VS  4165
    8 CONTINUE                                                                  VS  4166
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      KH=0                                                                VS  4167
      IF(IJ.EQ.LPAN1(L).AND.IJ.NE.LPN(L)) KH=1                            VS  4168
      IF(KH.EQ.1.AND.L.EQ.1) IL=IL-NS(L)                                  VS  4169
      IF(KH.EQ.1.AND.L.GT.1) IL=IL-NS(L)+NS(L-1)                          VS  4170
      IF(KH.EQ.1.AND.L.EQ.1) IW=IW-NS(L)                                  VS  4171
      IF(KH.EQ.1.AND.L.GT.1) IW=IW-NS(L)+NS(L-1)                          VS  4172
      IF(IJ.EQ.LPN(L).AND.NW(L,2).NE.0) KH=2                              VS  4173
      IF(KH.EQ.2.AND.L.EQ.1) IL=IL+NS(L)                                  VS  4174
      IF(KH.EQ.2.AND.L.GT.1) IL=IL+NS(L)-NS(L-1)                          VS  4175
    6 IF(IJ.EQ.LPN(L)) L=L+1                                              VS  4176
C     IF(I.EQ.2) WRITE(JPT,17) (CA(IJ),IJ=1,LWF)                          VS  4177
      REWIND 02                                                           VS  4178
      IF(NAUG.EQ.1) GO TO 41                                              VS  4179
      IF(NALP.EQ.1) GO TO 40                                              VS  4180
   41 CONTINUE                                                            VS  4181
      DO 45 K=1,LWF                                                       VS  4182
   45 READ(02)(AW(J),J=1,LWF)                                             VS  4183
   40 DO 50 J=1,LWF                                                       VS  4184
      GAMMA(J)=0.                                                         VS  4185
      READ(02) (AW(K),K=1,LWF)                                            VS  4186
      DO 55 K=1,LWF                                                       VS  4187
   55 GAMMA(J)=GAMMA(J)-AW(K)*CA(K)                                       VS  4188
   50 CONTINUE                                                            VS  4189
   17 FORMAT(10F10.5)                                                     VS  4190
      PSI(29)=CFF                                                         VS  4191
      CALL THRUST(LPANEL,GAMMA,SNALP,LPAN1,ICAM,ICAMB,NLEF,NAL,IV,IWING,VS  4192
     1YK,DC,DS,CA,IWGLT,KZ,P,BK,RL,CNALP,DF,NC1,KT,RC,ICAMT,SWPP,IBLC,   VS  4193
     2YCON,BREAK)                                                         VS  4194
      IA=I                                                                VS  4195
      CALL GAMAX (AW,CA,LPAN1,LPANEL,GAMMA,BREAK,CHORDT,IWING,            VS  4196
     1YCN,SLOPE,CTX,IWGLT,KZ,SE,IA)                                       VS  4197
      IF(I.EQ.1) GO TO 65                                                 VS  4198
      IF(I.EQ.2) GO TO 60                                                 VS  4199
      DO 59 K=1,LWF                                                       VS  4200
      GAMR(K)=GAMMA(K)                                                    VS  4201
      IF(K.LE.LPANEL) GO TO 61                                            VS  4202
      GO TO 59                                                            VS  4203
   61 GAMR(K)=GAMMA(K)*DUMC(K)-YV(K)/HALFB(1)*CP(K)*RL-(XV(K)-XREF)/HALFVS  4204
     1B(1)*GAMX(K)*RL*DUM(K)-DUMX(K)*CA(K)                                VS  4205
   59 CONTINUE                                                            VS  4206
C     WRITE(JPT,17)(GAMR(K),K=1,LWF)                                      VS  4207
      DO 56 K=1,NCS                                                       VS  4208
   56 Y(4,K)=CD(K)                                                        VS  4209
      IF(MZ.EQ.0) GO TO 70                                                VS  4210
      DO 77 K=1,NCS                                                       VS  4211
      BR=-(X(11,K)-XREF)/HALFB(1)*RLL                                     VS  4212
   77 CD(K)=2.*DMM(K)*BR                                                  VS  4213
      CALL SPNINT(NVL1(1),NVL2(1),NS,CD,SJ,SWEEP,M1,X,GR,WIDTH,GRW)       VS  4214
      GR= GRW*GM/GW                                                       VS  4215
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      CALL AUGVOR(AW,CA,GAMR,GR,LPANEL,X2,Y2,Z2,B,ZZCP,XCP,YCP,1)        VS  4216
      GO TO 70                                                           VS  4217
   65 DO 58 K=1,LWF                                                      VS  4218
      GAMP(K)=GAMMA(K)                                                   VS  4219
      IF(K.LE.LPANEL) GO TO 62                                           VS  4220
      GO TO 58                                                           VS  4221
   62 GAMP(K)=GAMMA(K)*DUMC(K)+DUM(K)*P*DUMZ(K)/HALFB(1)*GAMX(K)         VS  4222
     1-DUMS(K)*P*DUMY(K)/HALFB(1)*GAMX(K)-DUMX(K)*CA(K)                  VS  4223
   58 CONTINUE                                                           VS  4224
      DO 63 K=1,NCS                                                      VS  4225
   63 Y(2,K)=CD(K)                                                       VS  4226
C     WRITE(JPT,17) (CD(K),K=1,NCS)                                      VS  4227
C     WRITE(JPT,17)(GAMP(K),K=1,LWF)                                     VS  4228
      IF(MZ.EQ.0) GO TO 70                                               VS  4229
      DO 76 K=1,NCS                                                      VS  4230
   76 CD(K)=X(12,K)*2.*Y(1,K)*Y(2,K)*X(14,K)*X(13,K)                     VS  4231
C     WRITE(JPT,17) (X(12,K),K=1,NCS)                                    VS  4232
C     WRITE(JPT,17)(X(13,K),K=1,NCS)                                     VS  4233
C     WRITE(JPT,17) (X(14,K),K=1,NCS)                                    VS  4234
      CALL SPNINT(NVL1(1),NVL2(1),NS,CD,SJ,SWEEP,M1,X,GP,WIDTH,GPW)      VS  4235
      GP=GPW*GM/GW                                                       VS  4236
      CALL AUGVOR(AW,CA,GAMP,GP,LPANEL,X2,Y2,Z2,B,ZZCP,XCP,YCP,1)        VS  4237
      GO TO 70                                                           VS  4238
   60 DO 57 K=1,LWF                                                      VS  4239
      GAMB(K)=GAMMA(K)                                                   VS  4240
      IF(K.LE.LPANEL) GO TO 66                                           VS  4241
      GO TO 57                                                           VS  4242
   66 GAMB(K)=GAMMA(K)*DUMC(K)+BK*GAMX(K)*DUM(K)-DUMX(K)*CA(K)           VS  4243
   57 CONTINUF                                                           VS  4244
      DO 67 K=1,NCS                                                      VS  4245
   67 Y(3,K)=CD(K)                                                       VS  4246
C     WRITE(JPT,17) (CD(K),K=1,NCS)                                      VS  4247
C     WRITE(JPT,17)(GAMB(K),K=1,LWF)                                     VS  4248
      IF(MZ.EQ.0) GO TO 70                                               VS  4249
      GBB=GM*2.*BKK                                                      VS  4250
      CALL AUGVOR(AW,CA,GAMB,GBB,LPANEL,X2,Y2,Z2,B,ZZCP,XCP,YCP,1)       VS  4251
   70 IF(I.EQ.1) GO TO 75                                                VS  4252
      IF(I.EQ.3) GO TO 35                                                VS  4253
      RL=RLL                                                             VS  4254
      BK=0.                                                              VS  4255
      GO TO 35                                                           VS  4256
   75 BK=BKK                                                             VS  4257
      P=0.                                                               VS  4258
   35 CONTINUE                                                           VS  4259
      RETURN                                                             VS  4260
      END                                                                VS  4261
C      FORTRAN NLSTIN                                                    VS  4262
      SUBROUTINE WBETA(X,Y,Z,WN,DSS,DCC,BK,RL,HALFB,DS,DC,NCS,IV,IWING,  VS  4263
     1YK,IWGLT,NASYM,NC1,DSK,DCK,LL,BREAK)                               VS  4264
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C     TO CALCULATE DOWNWASH DUE TO ADDITIONAL WAKE VORTICES IN SIDESLIP VS   4265
      DIMENSION DSK(6,1),DCK(6,1),HALFB(1),IV(1),IWING(1)               VS   4266
      DIMENSION DS(1),DC(1),CON(2),W(2),V(2),YK(6,1)                    VS   4267
      DIMENSION IWGLT(1),BREAK(6,1)                                     VS   4268
      COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS   4269
     15),DIST,PP,BKK,RLL,CFF                                            VS   4270
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT, VS   4271
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)            VS   4272
      COMMON /INOUT/ INPT,JPT                                           VS   4273
      DATA CON/1.,-1./                                                  VS   4274
      DIST2=0.5*DIST                                                    VS   4275
      FN=NCG                                                            VS   4276
      WW=0.                                                             VS   4277
      VV=0.                                                             VS   4278
      XREF=GMAX(50)                                                     VS   4279
      LG=1                                                              VS   4280
      IF(NGRD.EQ.1) LG=2                                                VS   4281
      ZA=0.                                                             VS   4282
      YA=BREAK(1,1)                                                     VS   4283
      YAA=BREAK(1,1)                                                    VS   4284
      IF(NASYM.EQ.0) GO TO 40                                           VS   4285
      YA=YK(1,NC1)                                                      VS   4286
      YAA=YA                                                            VS   4287
      IF(NC1.EQ.1) GO TO 40                                             VS   4288
      NC11=NC1-1                                                        VS   4289
      DO 41 I=1,NC11                                                    VS   4290
      ZA=ZA+(YK(1,I)-YK(1,I+1))*DSK(1,I+1)                              VS   4291
   41 YAA=YAA+(YK(1,I)-YK(1,I+1))*DCK(1,I+1)                            VS   4292
      YA=YK(1,1)                                                        VS   4293
   40 CONTINUE                                                          VS   4294
      IPN=1                                                             VS   4295
      L=1                                                               VS   4296
      IM=0                                                              VS   4297
      DO 1 I=1,NCS                                                      VS   4298
      W(2)=0.                                                           VS   4299
      V(2)=0.                                                           VS   4300
      IF(ABS(BK).GT.0.0001) PR=BK*DC(I)                                 VS   4301
      ISM=2                                                             VS   4302
      IF (IV(L).EQ.1) ISM=1                                             VS   4303
C     J=2 FOR LEFT WING EFFECT                                          VS   4304
      IF(NASYM.EQ.1) ISM=1                                              VS   4305
      DO 9 J=1,ISM                                                      VS   4306
      W(J)=0.                                                           VS   4307
      V(J)=0.                                                           VS   4308
      ADD=0.                                                            VS   4309
      YC=Y*CON(J)                                                       VS   4310
      NSEG=1                                                            VS   4311
      IH=I+IM                                                           VS   4312
      IHI=I+1+IM                                                        VS   4313
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      AVX=0.5*(XTG(IH)+XTG(IHI))                                        VS  4314
      KSE=NS(LL)                                                        VS  4315
      KSI=0                                                             VS  4316
      IF(LL.GT.1) KSI=NS(LL-1)                                          VS  4317
      IF(YC.GT.YTG(IH).AND.YC.LT.YTG(IHI)) GO TO 2                      VS  4318
      IF(I.GT.KSI.AND.I.LE.KSE) GO TO 3                                 VS  4319
      IF(X.GT.AVX) ADD=X-AVX                                            VS  4320
      GO TO 3                                                           VS  4321
    2 IF(I.GT.KSI.AND.I.LE.KSE) GO TO 3                                 VS  4322
      IF(X.LT.AVX) GO TO 3                                              VS  4323
      NSEG=2                                                            VS  4324
    3 CONTINUE                                                          VS  4325
      DO 4 KY=1,NSEG                                                    VS  4326
      DX=DIST2+ADD*0.5                                                  VS  4327
      DXX=DIST+ADD                                                      VS  4328
      IF(NSEG.EQ.1) GO TO 6                                             VS  4329
      IF(KY.EQ.1) DX=(X-AVX)*0.5                                        VS  4330
      IF(KY.EQ.1) DXX=X-AVX                                             VS  4331
    6 CONTINUE                                                          VS  4332
  100 FORMAT (2X,2I4,2X,8F10.5)                                         VS  4333
      XP1=XTG(IH)                                                       VS  4334
      XP2=XTG(IHI)                                                      VS  4335
      IF(NSEG.EQ.2.AND.KY.EQ.NSEG) XP1=XP1+X-AVX                        VS  4336
      IF(NSEG.EQ.2.AND.KY.EQ.NSEG) XP2=XP2+X-AVX                        VS  4337
      DO 5 K=1,NCG                                                      VS  4338
      DO 5 KK=1,LG                                                      VS  4339
      QX1=XP1+DX*(1.-CTG(K))                                            VS  4340
      QX2=XP2+DX*(1.-CTG(K))                                            VS  4341
      IF(ABS(RL).GT.0.0001) PR=-RL*(0.5*(QX1+QX2)-XREF)/HALFB(1)        VS  4342
      IF(ABS(RL).GT. 0.0001) GO TO 10                                   VS  4343
      X1=QX1-X                                                          VS  4344
      X2=QX2-X                                                          VS  4345
      X12=QX2-QX1                                                       VS  4346
      IF(ABS(DCC-DC(I)).GT.0.001) GO TO 26                              VS  4347
      IF(ABS(DSS-DS(I)).GT.0.001) GO TO 26                              VS  4348
      IF(NC(L).GT.1) GO TO 26                                           VS  4349
      IF(J.EQ.1.AND.KK.EQ.1) GO TO 25                                   VS  4350
   26 PS=DS(I)                                                          VS  4351
      PC=DC(I)                                                          VS  4352
      GO TO 27                                                          VS  4353
   25 PS=0.                                                             VS  4354
      PC=1.                                                             VS  4355
   27 CONTINUE                                                          VS  4356
      Y12=YTG(IHI)-YTG(IH)                                              VS  4357
      Z12=ZTG(IHI)-ZTG(IH)+Y12*PS                                       VS  4358
      Y12=Y12*PC                                                        VS  4359
      Y1=YAA+(YTG(IH)-YA)*PC-YC                                         VS  4360
      Y2=YAA+(YTG(IHI)-YA)*PC-YC                                        VS  4361
      XYK=X1*Y12-Y1*X12                                                 VS  4362
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      IF(KK.EQ.1) GO TO 7                                                    VS  4363
      ZC=-2.*(Z+HEIGHT)+Z                                                    VS  4364
      GE=-1.                                                                 VS  4365
      FCON=1.                                                                VS  4366
      GO TO 8                                                                VS  4367
    7 ZC=Z                                                                   VS  4368
      GE=1.                                                                  VS  4369
      FCON=0.                                                                VS  4370
    8 Z1=ZTG(IH)-ZC+ZA+(YTG(IH)-YA)*PS                                       VS  4371
      Z2=ZTG(IHI)-ZC+ZA+(YTG(IHI)-YA)*PS                                     VS  4372
      XZJ=X1*Z12-Z1*X12                                                      VS  4373
      UCOM=-Z1*Y12*(-ATT)*FCON                                               VS  4374
      YZI=Y1*Z12-Z1*Y12                                                      VS  4375
      ALB1=XYK*XYK+XZJ*XZJ+B2*YZI*YZI                                        VS  4376
      RB1=SQRT(X1*X1+B2*Y1*Y1+B2*Z1*Z1)                                      VS  4377
      RB2=SQRT(X2*X2+B2*Y2*Y2+B2*Z2*Z2)                                      VS  4378
      UB=(X2*X12+B2*Y2*Y12+B2*Z2*Z12)/RB2-(X1*X12+B2*Y1*Y12+B2*Z1*Z12)/      VS  4379
     1RB1                                                                    VS  4380
      GB1=(1.-X1/RB1)/(Y1*Y1+Z1*Z1)                                          VS  4381
      GB2=(1.-X2/RB2)/(Y2*Y2+Z2*Z2)                                          VS  4382
      F1=UB*(UCOM+XYK)*GE/ALB1                                               VS  4383
      F2=(-Y2*GB2+Y1*GB1)*GE                                                 VS  4384
      F3=-XZJ*UB/ALB1*CON(J)                                                 VS  4385
      F4=(Z2*GB2-Z1*GB1)*CON(J)                                              VS  4386
      P1=-(F3+F4)*STG(K)*GMAX(I)*DXX/FN                                      VS  4387
      P2=-(F1+F2)*STG(K)*GMAX(I)*DXX/FN                                      VS  4388
      WRITE(03) P1,P2                                                        VS  4389
      GO TO 11                                                               VS  4390
   10 READ(03) P1,P2                                                         VS  4391
   11 V(J)=V(J)+P1*PR                                                        VS  4392
    5 W(J)=W(J)+P2*PR                                                        VS  4393
    4 CONTINUE                                                               VS  4394
    9 CONTINUE                                                               VS  4395
      IF(ABS(RL).GT.0.0001) GO TO 30                                         VS  4396
      IF(I.EQ.NCS) GO TO 30                                                  VS  4397
      IF(I.EQ.NS(L)) GO TO 17                                                VS  4398
      IF (IWING(L).NE.0.AND.I.EQ.IWING(L)) GO TO 17                          VS  4399
      IF(YTG(IHI).LT.YK(L,IPN)) GO TO 30                                     VS  4400
   17 NJ=0                                                                   VS  4401
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NJ=1                                     VS  4402
      IF(NJ.EQ.1) IPN=IPN+1                                                  VS  4403
      ZA=ZA+(YK(L,IPN)-YA)*DSK(L,IPN)                                        VS  4404
      YAA=YAA+(YK(L,IPN)-YA)*DCK(L,IPN)                                      VS  4405
      YA=YK(L,IPN)                                                           VS  4406
      IF(IWING(L).NE.0.AND.I.EQ.IWING(L)) GO TO 23                           VS  4407
      IF(I.EQ.NS(L)) GO TO 23                                                VS  4408
      GO TO 24                                                               VS  4409
   23 IF (IWGLT(L).EQ.1) GO TO 24                                            VS  4410
      ZA=0.                                                                  VS  4411
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      YA=BREAK(L,1)                                                     VS  4412
      YAA=BREAK(L,1)                                                    VS  4413
      IF(I.EQ.NS(L).AND.L.LT.6) YA=BREAK(L+1,1)                         VS  4414
      IF(I.EQ.NS(L).AND.L.LT.6) YAA=BREAK(L+1,1)                        VS  4415
      IF(I.EQ.NS(L)) GO TO 24                                           VS  4416
      IF (IWGLT(L).NE.2) GO TO 24                                       VS  4417
      ZA=YK(L,NC(L)-2)*DSK(L,1)                                         VS  4418
      YAA=YK(L,NC(L)-2)*DCK(L,1)                                        VS  4419
      YA=YK(L,NC(L)-2)                                                  VS  4420
   24 IF(NJ.NE.1) IPN=IPN+1                                             VS  4421
   30 CONTINUE                                                          VS  4422
      IF(I.EQ.NS(L)) IPN=1                                              VS  4423
      WW=WW+(W(1)-W(2))/8.                                              VS  4424
      VV=VV+(V(1)-V(2))/8.                                              VS  4425
      IF(I.EQ.NS(L)) IM=IM+1                                            VS  4426
      IF(I.EQ.NS(L)) L=L+1                                              VS  4427
    1 CONTINUE                                                          VS  4428
      WN=WW*DCC-VV*DSS                                                  VS  4429
      RETURN                                                            VS  4430
      END                                                               VS  4431
C      FORTRAN NLSTIN                                                   VS  4432
      FUNCTION VLCTY(X,Y,Z,X2,Y2,Z2,GM,B2)                              VS  4433
C     TO CALCULATE THE DOWNWASH DUE TO A DISCRETE VORTEX                VS  4434
      PI=3.14159265                                                     VS  4435
      F1=(Y2-Y)**2+(Z2-Z)**2                                            VS  4436
      F2=SQRT((X2-X)**2+B2*F1)                                          VS  4437
      VLCTY=-GM/(4.*PI)*(Y2-Y)/F1*(1.-(X2-X)/F2)                        VS  4438
      RETURN                                                            VS  4439
      END                                                               VS  4440
C      FORTRAN NLSTIN                                                   VS  4441
      FUNCTION VERCOR(AP)                                               VS  4442
      IF(AP.LE.1.25) VERCOR=0.24*AP                                     VS  4443
      IF(AP.GT.1.25.AND.AP.LE.2.) VERCOR=0.1467*AP+0.1167               VS  4444
      IF(AP.GT.2.) VERCOR=0.05*AP+0.31                                  VS  4445
      RETURN                                                            VS  4446
      END                                                               VS  4447
C      LINK    LINK44,LINK33                                            VS  4448
C      FORTRAN NLSTIN                                                   VS  4449
      SUBROUTINE LOAD                                                   VS  4450
C     TO INTEGRATE THE LOADING AND OBTAIN TOTAL CHARACTERISTICS         VS  4451
      DIMENSION GAMMA(200)                                              VS  4452
      DIMENSION AW(201),CA(201),DMM(50)                                 VS  4453
      DIMENSION DYB(6),DYR(6)                                           VS  4454
      DIMENSION CPCWL(16),CPSWL(31),CLWL(6),CMWL(6),CDWL(6)             VS  4455
      DIMENSION CLS(50),CLY(50),CAVS(50),CPF(10,20)                     VS  4456
      DIMENSION FTL(6),CBMR(6),CBTR(6),CBML(6),CBTL(6),CLW(6),CMW(6),   VS  4457
     1CDW(6)                                                            VS  4458
      COMMON/LOOP/KI,NALP,KALP,TANC2,CLDS,AI,CLII,ALPII,ALPA(15)        VS  4459
      COMMON /VBDN/ ICOUNT,YBAR(6,2),YCMX(6,2),MSTP(6),YBR(6,2),YBRBR(6,VS  4460
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12),YBRBL(6,2),YD2(6,2),YDR2(6,2),YDL2(6,2),ABD(6,2),ABDR(6,2)      VS  4461
1,ABDL(6,2),YREF(6),YCBR(6,2),YCBL(6,2)                             VS  4462
 COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(200),LAT,CREF,BREF2          VS  4463
 COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),NAL(6)            VS  4464
1,YBREAK(6,7),DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6) VS  4465
1,ICAMT(6)                                                          VS  4466
 COMMON /AJG/ ALP,J1,CP(200),GAMP(200),GAMR(200),GAMR(200)          VS  4467
1,GAMX(200),ZZCP(200),DZY(200),BMP(6,50),BML(6,50),CSU(50)         VS  4468
 COMMON /SCHEME/ C(2),X(15,41),Y(15,41),SLOPE(15),XL(2,15),XTT(41),VS  4469
1XLL(41)                                                            VS  4470
 COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  4471
1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  4472
200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  4473
 COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                     VS  4474
 COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),   VS  4475
1NFP(6),NW(6,2)                                                     VS  4476
 COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),AAM(6,10,20),BBM(6,10,  VS  4477
120),CCM(6,10,20),DDM(6,10,20),YT(6,10),CURV(6,10),CHND(6,10)       VS  4478
 COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,  VS  4479
1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)             VS  4480
 COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,NCG,CTG(15),STG(1VS  4481
15),DIST,P,BK,PL,CFF                                                VS  4482
 COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10VS  4483
1,4),YLF(6,10,4),SLP1(6,10)                                         VS  4484
 COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,  VS  4485
120)                                                                VS  4486
 COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)          VS  4487
 COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)          VS  4488
 COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IACVX,PT                 VS  4489
1,NAUG,IBD,PBK,PIS,IDIH,ALPINC,IRL,KT,PI,ALO,ALZ                    VS  4490
2,NC1,NC2,IBLC                                                      VS  4491
 COMMON/GDSL/ DF(6,5),YCN(6,4),NLEF(6),NVRTX(6),SNALP(50),CNALP(50)VS  4492
1,ALPH(50),AUX(6,5),CRX(6,5),XTILT(6),SLETH(6),YCNTD(6)             VS  4493
1,NVL1(6),NVL2(6),XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF        VS  4494
1,BUX(6,5),SE(3,6,15),NUR(6),CVR(50),CPAUG(200)                     VS  4495
1,ALPBD(6,2),MX(6),ALBDBR(6,2),ALBDBL(6,2),MVRTX(6)                 VS  4496
 COMMON /SL/ COSA,SINA,MZ,CTX,YBAK,ZBK,GW,LATT                      VS  4497
 COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),   VS  4498
1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),FO,F10,KF,NTL,LWF,WKN,PDX,XU    VS  4499
 COMMON /INOUT/ INPT,JPT                                            VS  4500
 DATA DYB /6*0./                                                    VS  4501
 DATA DYR /6*0./                                                    VS  4502
 DATA CLWL /6*0./                                                   VS  4503
 DATA CMWL /6*0./                                                   VS  4504
 DATA CDWL /6*0./                                                   VS  4505
 DATA CLW /6*0./                                                    VS  4506
 DATA CMW /6*0./                                                    VS  4507
 DATA CDW /6*0./                                                    VS  4508
2 FORMAT (8F10.6)                                                   VS  4509
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3 FORMAT (8(6X,I4))                                                    VS  4510
8 FORMAT (1X,40H****************************************)              VS  4511
  YD2(1,1) = 0.                                                        VS  4512
  CLPP=0.                                                              VS  4513
  CDPP=0.                                                              VS  4514
  CDVL=0.                                                              VS  4515
  CLT=0.                                                               VS  4516
  CMT=0.                                                               VS  4517
  CDT=0.                                                               VS  4518
  CLL=0.                                                               VS  4519
  CLLV=0.                                                              VS  4520
  CNL=0.                                                               VS  4521
  CNLV=0.                                                              VS  4522
  CY=0.                                                                VS  4523
  CNB=0.                                                               VS  4524
  CLB=0.                                                               VS  4525
  CLP=0.                                                               VS  4526
  CYP=0.                                                               VS  4527
  CNP=0.                                                               VS  4528
  CYR=0.                                                               VS  4529
  CLRR=0.                                                              VS  4530
  CNR=0.                                                               VS  4531
  CYBV=0.                                                              VS  4532
  CYBVSE=0.                                                            VS  4533
  CNBV=0.                                                              VS  4534
  CNBVSE=0.                                                            VS  4535
  CLBV=0.                                                              VS  4536
  CLBVSE=0.                                                            VS  4537
  CYPV=0.                                                              VS  4538
  CYPVSE=0.                                                            VS  4539
  CNPV=0.                                                              VS  4540
  CNPVSE=0.                                                            VS  4541
  CLPV=0.                                                              VS  4542
  CLPVSE=0.                                                            VS  4543
  CYRV=0.                                                              VS  4544
  CYRSE=0.                                                             VS  4545
  CLRRV=0.                                                             VS  4546
  CLRVSE=0.                                                            VS  4547
  CNRV=0.                                                              VS  4548
  CNRVSE=0.                                                            VS  4549
  CSL = 0.                                                             VS  4550
  CSXL = 0.                                                            VS  4551
  CAX=0.                                                               VS  4552
  CAXV=0.                                                              VS  4553
  CPCV=0.                                                              VS  4554
  CRCV=0.                                                              VS  4555
  CBCV=0.                                                              VS  4556
  CSAUG=0.                                                             VS  4557
  CMAUG=0.                                                             VS  4558
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      CLGM=0.                                                           VS  4559
      CDGM=0.                                                           VS  4560
      CMGM=0.                                                           VS  4561
      CLDV=0.                                                           VS  4562
      CDDV=0.                                                           VS  4563
      CMDV=0.                                                           VS  4564
      CSNW=0.                                                           VS  4565
      CYPVA=0.                                                          VS  4566
      CLPVA=0.                                                          VS  4567
      CNPVA=0.                                                          VS  4568
      CYBVA=0.                                                          VS  4569
      CNBVA=0.                                                          VS  4570
      CLBVA=0.                                                          VS  4571
      CYRVA=0.                                                          VS  4572
      CLRRVA=0.                                                         VS  4573
      CNRVA=0.                                                          VS  4574
      DP=0.                                                             VS  4575
      DR=0.                                                             VS  4576
      DB=0.                                                             VS  4577
      KC=1                                                              VS  4578
      IJK=0                                                             VS  4579
      YCON(50)=NASYM                                                    VS  4580
      NCOL=M1(1,1)                                                      VS  4581
      KLL=0                                                             VS  4582
      MM=0                                                              VS  4583
      NCW1=NCW+1                                                        VS  4584
      IPN=1                                                             VS  4585
      ZB=0.                                                             VS  4586
      YB=BREAK(1,1)                                                     VS  4587
      YBB=BREAK(1,1)                                                    VS  4588
      IF(NASYM.EQ.0) GO TO 1373                                         VS  4589
      YB=YBREAK(1,NC1)                                                  VS  4590
      YBB=YB                                                            VS  4591
      IF(NC1.EQ.1) GO TO 1373                                           VS  4592
      NC11=NC1-1                                                        VS  4593
      DO 1374 I=1,NC11                                                  VS  4594
      ZB=ZB+(YBREAK(1,I)-YBREAK(1,I+1))*DSIN(1,I+1)                     VS  4595
1374  YBB=YBB+(YBREAK(1,I)-YBREAK(1,I+1))*DCOS(1,I+1)                   VS  4596
      YB=YBREAK(1,1)                                                    VS  4597
1373  CONTINUE                                                          VS  4598
      ZBK=ZB                                                            VS  4599
      YBBK=YBB                                                          VS  4600
      NCSS=NCS                                                          VS  4601
      COW=1.                                                            VS  4602
      SOW=0.                                                            VS  4603
      LL=1                                                              VS  4604
      YCBR(1,2)=0.                                                      VS  4605
      DO 5 I=1,LWF                                                      VS  4606
      GAMMA(I)=SCH(I)                                                   VS  4607
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    5 SCH(I)=CP(I)                                                        VS  4608
      DO 10 I=1,NCS                                                       VS  4609
      DMM(I)=CL(I)                                                        VS  4610
      CAVS(I)=BMR(6,I)                                                    VS  4611
   10 AW(I)=CL(I)                                                         VS  4612
      GB=SIN(BK)                                                          VS  4613
      GBC=COS(BK)                                                         VS  4614
      GB2=GB*GB                                                           VS  4615
C       VORTEX BREAKDOWN EFFECT                                           VS  4616
      ALMT=0.0349                                                         VS  4617
      IF (IALP.EQ.1) GO TO 2245                                           VS  4618
      IF(IBD.EQ.0) GO TO 2245                                             VS  4619
      IF(ALP.LT.ALMT.AND.ICOUNT.GE.1) ICOUNT=ICOUNT+1                     VS  4620
      IF(ALP.GE.ALMT) ICOUNT=ICOUNT+1                                     VS  4621
      IF(ALP.GE.ALMT.AND.ICOUNT.EQ.1) CALL CENTRD(NS,NSUR,NW,IWING,       VS  4622
     1CREF,HALFB,ALP,YLE,YN,SWEEP,AW,ALPBD,LPN,0.,AM,0,YCMX,MX,MSTP,YBR VS  4623
     2,BREAK,YREF,MVRTX,M1,NC,IAGVX,SJ,WIDTH,ICAM,CAVS,ABD,NASYM,IV,      VS  4624
     3NLEF,YD2,KF)                                                        VS  4625
      IF(IBD.EQ.0) GO TO 2245                                             VS  4626
      IF(LAT.NE.1) GO TO 2243                                             VS  4627
      IF(ICOUNT.NE.1) GO TO 2245                                          VS  4628
      CALL CENTRD(NS,NSUR,NW,IWING,CREF,HALFB,ALP,YLE,YN,SWEEP,AW, ALBDBVS  4629
     1R,LPN,BK,AM,1,YCBR,MX,MSTP,YBR,BREAK,YREF,MVRTX,M1,NC,IAGVX,SJ,     VS  4630
     2WIDTH,ICAM,CAVS,ABD,NASYM,IV,NLEF,YD2,KF)                           VS  4631
      IF(NASYM.EQ.1) GO TO 2245                                           VS  4632
      CALL CENTRD(NS,NSUR ,NW,IWING,CREF,HALFB,ALP,YLE,YN,SWEEP,AW,ALBDBVS  4633
     1L,LPN,BK,AM,2,YCBL,MX,MSTP,YBR,BREAK,YREF,MVRTX,M1,NC,IAGVX,SJ,     VS  4634
     2WIDTH,ICAM,CAVS,ABD,NASYM,IV,NLEF,YD2,KF)                           VS  4635
 2243 CONTINUE                                                            VS  4636
      WRITE(JPT,8)                                                        VS  4637
      WRITE(JPT,700)                                                      VS  4638
  700 FORMAT(2X,76H***THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E. VS  4639
     1HAVE BEEN CORRECTED FOR/10X,75HCAMBER AND ADVERSE PRESSURE GRADIENVS  4640
     2T IN VORTEX LIFT AUGMENTATION, IF ANY***)                           VS  4641
 2245 CONTINUE                                                            VS  4642
      JA=0                                                                VS  4643
      DO 2233 K=1,NSUR                                                    VS  4644
      IF(NASYM.EQ.0) GO TO 2145                                           VS  4645
      YCBL(K,1)=YCBR(K,1)                                                 VS  4646
      YCBL(K,2)=YCBR(K,2)                                                 VS  4647
      ALBDBL(K,1)=ALBDBR(K,1)                                             VS  4648
      ALBDBL(K,2)=ALBDBR(K,2)                                             VS  4649
 2145 CONTINUE                                                            VS  4650
      IF(IBD.EQ.0) MX(K)=1                                                VS  4651
      IF(IBD.EQ.0) MSTP(K)=0                                              VS  4652
      IG=0                                                                VS  4653
      IF(MVRTX(K).NE.0) IG=1                                              VS  4654
      IF (IBD.NE.0) WRITE(JPT,69) K                                       VS  4655
   69 FORMAT(/2X,21H***FOR SURFACE NUMBER, I3,2X,3H***)                   VS  4656
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      K2 = MX(K)                                                        VS  4657
      DO 2233 I=1,K2                                                    VS  4658
      JA=JA+1                                                           VS  4659
      IF(JA.GT.6) JA=6                                                  VS  4660
      DXTE=0.                                                           VS  4661
      YBAR(K,I)=1.                                                      VS  4662
      MT=0                                                              VS  4663
      MCNT=0                                                            VS  4664
      IA=IG+I                                                           VS  4665
      NA=YD2(K,I)                                                       VS  4666
      IF(I.EQ.2) IA=YD2(K,1)+1                                          VS  4667
      DA=0.                                                             VS  4668
      IF(IBD.EQ.0.OR.IALP.EQ.1) GO TO 909                               VS  4669
      IF(ICOUNT.NE.1) GO TO 909                                         VS  4670
      IF(ABS(XTILT(JA)).LT.1.E-3) GO TO 909                             VS  4671
      DXR=AUX(K,IA)-CRX(K,IA)                                           VS  4672
      XR=AUX(K,NA)-DXR                                                  VS  4673
      DX=0.                                                             VS  4674
      IF(XR.GT.1.E-3) DX=ABS(XTILT(JA)/XR)                              VS  4675
      DA=REDBD(DX)*PI/180.                                              VS  4676
      IF(XTILT(JA).LT.0.) DA=-2.*DA                                     VS  4677
  909 CONTINUE                                                          VS  4678
  910 FORMAT(/2X,20HREVISED ALPHA BDTE =,F10.3,7HDEGREES)               VS  4679
      IF(IALP.EQ.1) GO TO 2233                                          VS  4680
      IF(IBD.EQ.0) GO TO 2251                                           VS  4681
      IF(ICOUNT.NE.1) GO TO 911                                         VS  4682
      ABD(K,I)=ALPBD(K,I)                                               VS  4683
      ALPBD(K,I)=ALPBD(K,I)-DA                                          VS  4684
      IF(ALPBD(K,I).LT.0.) ALPBD(K,I)=0.                                VS  4685
  911 CONTINUE                                                          VS  4686
      IF(ALP.LT.ALPBD(K,I)) GO TO 2251                                  VS  4687
      ALPDT=(ALP-ALPBD(K,I))*180./PI                                    VS  4688
 2250 CONTINUE                                                          VS  4689
      DXTE=BDPT(ALPDT)                                                  VS  4690
      IF(MT.EQ.1) GO TO 2254                                            VS  4691
      YBAR(K,I)=1.-DXTE                                                 VS  4692
      IF(YBAR(K,I).LT.0.) YBAR(K,I)=0.                                  VS  4693
      IF(ALPDT.LT.8.) GO TO 2251                                        VS  4694
      ALPDT=ALPDT-8.                                                    VS  4695
      MT=1                                                              VS  4696
      GO TO 2250                                                        VS  4697
  2254 CONTINUE                                                         VS  4698
  2251 CONTINUE                                                         VS  4699
C     WRITE(JPT,2) ALP,ALPBD(K,I),YD2(K,I),ALPDT                        VS  4700
      AA=ALPBD(K,I)*180./PI                                             VS  4701
      IF(IBD.EQ.1) WRITE(JPT,910) AA                                    VS  4702
      IF (IBD.NE.0) WRITE(JPT,701)                                      VS  4703
   701 FORMAT(5X,25H(FOR SYMMETRICAL LOADING))                          VS  4704
      YBRBR(K,I)=1.                                                     VS  4705
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      YBRBL(K,I)=1.                                                          VS  4706
      YDR2(K,I)=1.                                                           VS  4707
      YDL2(K,I)=1.                                                           VS  4708
      IF(IBD.EQ.0) GO TO 2233                                                VS  4709
      IF(LAT.NE.1) GO TO 2233                                                VS  4710
      DXTE=0.                                                                VS  4711
      IF(ICOUNT.NE.1) GO TO 912                                              VS  4712
      ABDR(K,I)=ALBDBR(K,I)                                                  VS  4713
      ABDL(K,I)=ALBDBL(K,I)                                                  VS  4714
      ALBDBR(K,I)=ALBDBR(K,I)-DA                                             VS  4715
      ALBDBL(K,I)=ALBDBL(K,I)-DA                                             VS  4716
      IF(ALBDBR(K,I).LT.0.) ALBDBR(K,I)=0.                                   VS  4717
      IF(ALBDBL(K,I).LT.0.) ALBDBL(K,I)=0.                                   VS  4718
  912 CONTINUE                                                               VS  4719
      AA=ALBDBR(K,I)*180./PI                                                 VS  4720
      BB=ALBDBL(K,I)*180./PI                                                 VS  4721
      WRITE(JPT,910) AA                                                      VS  4722
      WRITE(JPT,702)                                                         VS  4723
  702 FORMAT(5X,28H(FOR RIGHT WING IN SIDESLIP))                             VS  4724
      WRITE(JPT,910) BB                                                      VS  4725
      WRITE(JPT,703)                                                         VS  4726
  703 FORMAT(5X,27H(FOR LEFT WING IN SIDESLIP))                              VS  4727
      IF(ALP.LT.ALBDBR(K,I)) GO TO 2249                                      VS  4728
      ALPDT=(ALP-ALBDBR(K,I))*180./PI                                        VS  4729
      DXTE=BDPT(ALPDT)                                                       VS  4730
      YBRBR(K,I)=1.-DXTE                                                     VS  4731
 2249 IF(ALP.LT.ALBDBL(K,I)) GO TO 2248                                      VS  4732
      ALPDT=(ALP-ALBDBL(K,I))*180./PI                                        VS  4733
      DXTE=BDPT(ALPDT)                                                       VS  4734
      YBRBL(K,I)=1.-DXTE                                                     VS  4735
 2248 CONTINUE                                                               VS  4736
      IF(YBRBR(K,I).LT.0.) YBRBR(K,I)=0.                                     VS  4737
      IF(YBRBL(K,I).LT.0.) YBRBL(K,I)=0.                                     VS  4738
      ALPDT=(ALP-ALBDBR(K,I))*180./PI-8.                                     VS  4739
      IF(ALPDT.LT.0.) GO TO 2247                                             VS  4740
      DXTE=BDPT(ALPDT)                                                       VS  4741
      YDR2(K,I)=1.-DXTE                                                      VS  4742
 2247 ALPDT=(ALP-ALBDBL(K,I))*180./PI-8.                                     VS  4743
      IF(ALPDT.LT.0.) GO TO 2233                                             VS  4744
      DXTE=BDPT(ALPDT)                                                       VS  4745
      YDL2(K,I)=1.-DXTE                                                      VS  4746
      IF(YDR2(K,I).LT.0.) YDR2(K,I)=0.                                       VS  4747
      IF(YDL2(K,I).LT.0.) YDL2(K,I)=0.                                       VS  4748
 2233 CONTINUE                                                               VS  4749
C     WRITE(JPT,2)YBRBR(1,1),YBRBL(1,1),ALBDBR(1,1),ALBDBL(1,1),YBR(1,1)     VS  4750
C     WRITE(JPT,3) MX(1),MSTP(1)                                             VS  4751
C     IF(LAT.EQ.1) WRITE(JPT,2) YDR2(1,1),YDL2(1,1)                          VS  4752
      KCH=1                                                                  VS  4753
      K=1                                                                    VS  4754
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      NL=1                                                              VS  4755
      JK=0                                                              VS  4756
      JWING=IWING(K)                                                    VS  4757
      TQ=2.                                                             VS  4758
      JA=1                                                              VS  4759
      LL=1                                                              VS  4760
      KY=0                                                              VS  4761
      KS=0                                                              VS  4762
      KR=0                                                              VS  4763
      DR=0.                                                             VS  4764
      DRR=0.                                                            VS  4765
      SRR=0.                                                            VS  4766
      DBB=0.                                                            VS  4767
      YBA=0.                                                            VS  4768
      YBD=0.                                                            VS  4769
      YBC=0.                                                            VS  4770
      SYB=HALFB(1)                                                      VS  4771
      SYR=HALFB(1)                                                      VS  4772
      SSB=HALFB(1)                                                      VS  4773
      ICONT=1                                                           VS  4774
      ABRN=0.                                                           VS  4775
      ABR=0.                                                            VS  4776
      YYB=0.                                                            VS  4777
      RTK=1.                                                            VS  4778
      RTD=1.                                                            VS  4779
      RTBR=1.                                                           VS  4780
      RTBL=1.                                                           VS  4781
      DO 2144 I=1,NSUR                                                  VS  4782
      CLW(I)=0.                                                         VS  4783
      CMW(I)=0.                                                         VS  4784
      CDW(I)=0.                                                         VS  4785
      CLWL(I)=0.                                                        VS  4786
      CMWL(I)=0.                                                        VS  4787
 2144 CDWL(I)=0.                                                        VS  4788
C       SPANWISE INTEGRATION                                            VS  4789
      DO 150 I=1,NCS                                                    VS  4790
      KN=K                                                              VS  4791
      IF(K.GT.1) KN=K-1                                                 VS  4792
      IQ=I                                                              VS  4793
      IF(K.GT.1) IQ=I-NS(K-1)                                           VS  4794
      IF(I.NE.(NS(KN)+1)) GO TO 2244                                    VS  4795
      KY=0                                                              VS  4796
      KS=0                                                              VS  4797
      KR=0                                                              VS  4798
      ICONT=1                                                           VS  4799
      YYB=0.                                                            VS  4800
      SYB=HALFB(K)                                                      VS  4801
      SYR=HALFB(K)                                                      VS  4802
      SSB=HALFB(K)                                                      VS  4803
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      DR=0.                                                             VS  4804
      DRB=0.                                                            VS  4805
      DRR=0.                                                            VS  4806
      SRR=0.                                                            VS  4807
      YBA=0.                                                            VS  4808
      YBO=0.                                                            VS  4809
      YBC=0.                                                            VS  4810
      ZB=0.                                                             VS  4811
      YB=BREAK(K,1)                                                     VS  4812
      YBB=BREAK(K,1)                                                    VS  4813
 2244 CONTINUE                                                          VS  4814
      BML(5,K)=0.                                                       VS  4815
      MA=1                                                              VS  4816
      IF(I.GE.MSTP(K).AND.MSTP(K).NE.0) MA=2                            VS  4817
      NB=YD2(K,MA)                                                      VS  4818
      IF(NASYM.EQ.1.AND.MA.EQ.1) NB=NB+1                                VS  4819
      NO=1                                                              VS  4820
      IF(MVRTX(K).NE.0) NO=2                                            VS  4821
      IF(MA.EQ.2) NO=YD2(K,MA-1)+1                                      VS  4822
C     WRITE(JPT,3) NO,NB,K,IV(K)                                        VS  4823
      IF(MA.EQ.2.AND.I.EQ.MSTP(K)) KY=0                                 VS  4824
      IF(MA.EQ.2.AND.I.EQ.MSTP(K)) KR=0                                 VS  4825
      IF(MA.EQ.2.AND.I.EQ.MSTP(K)) KS=0                                 VS  4826
      JZ=2                                                              VS  4827
      IF(NLEF(K).EQ.1) JZ=1                                             VS  4828
      COD=DCOS(K,IPN)                                                   VS  4829
      SOD=DSIN(K,IPN)                                                   VS  4830
      FATR=1.                                                           VS  4831
      I1=0                                                              VS  4832
      IF(IV(K).EQ.1) FATR=0.5                                           VS  4833
      IF(NW(K,2).EQ.0) GO TO 160                                        VS  4834
      IF(K.EQ.1) I1=KCH+NS(K)                                           VS  4835
      IF(K.GT.1) I1=KCH+NS(K)-NS(K-1)                                   VS  4836
      CHORD=CH(KCH)+CH(I1)                                              VS  4837
      GO TO 161                                                         VS  4838
  160 CHORD=CH(KCH)                                                     VS  4839
  161 CONTINUE                                                          VS  4840
      KH=KCH                                                            VS  4841
      IF(I1.NE.0) KH=I1                                                 VS  4842
      FS=COS(SWEEP(KCH))                                                VS  4843
      SSN=SIN(SWEEP(KCH))                                               VS  4844
      FTAN=SSN/FS                                                       VS  4845
      TAN=FTAN                                                          VS  4846
      IF(LAT.NE.1) GO TO 2255                                           VS  4847
      BR=-(XLE(KCH)-XREF)/HALFB(1)*RL                                   VS  4848
      BR2=BR*BR                                                         VS  4849
      RG=ABS(DMM(I))*(2.*ABS(GB)+FTAN*GB2)                              VS  4850
      RGR=ABS(DMM(I))*(2.*ABS(BR)+FTAN*BR2)                             VS  4851
      RATR=TO*RGR/CHORD                                                 VS  4852
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      RAT=TO*PG/CHORD                                                   VS  4853
 2255 CONTINUE                                                          VS  4854
      IF(I.EQ.1.OR.I.EQ.MSTP(K)) GO TO 2253                             VS  4855
      IF(I.NE.(NS(K)+1)) GO TO 2252                                     VS  4856
 2253 CONTINUE                                                          VS  4857
      IF(IALP.EQ.1.OR.IBD.EQ.0) GO TO 2252                              VS  4858
      IF(ICOUNT.LT.1) GO TO 2252                                        VS  4859
      RTK=FRATN(YCMX(K,MA))                                             VS  4860
      RTD=RTK                                                           VS  4861
      IF(LAT.NE.1) GO TO 2252                                           VS  4862
      RTBR =FRATN(YCBR(K,MA))                                           VS  4863
      RTBL=FRATN(YCBL(K,MA))                                            VS  4864
      BML(3,K)=RTBR                                                     VS  4865
      BML(2,K)=RTBL                                                     VS  4866
      BMR(2,K)=RTK                                                      VS  4867
C     WRITE(JPT,2) RTK,RTBR,RTBL                                        VS  4868
 2252 CONTINUE                                                          VS  4869
      IF(MX(K).EQ.2) GO TO 2260                                         VS  4870
      HREF=HALFB(K)-BREAK(K,1)                                          VS  4871
      YD=BREAK(K,1)                                                     VS  4872
      GO TO 2261                                                        VS  4873
 2260 IF(MVRTX(K).NE.0) GO TO 2262                                      VS  4874
      HREF=YREF(K)-BREAK(K,1)                                           VS  4875
      YD=BREAK(K,1)                                                     VS  4876
      GO TO 2263                                                        VS  4877
 2262 HREF=YREF(K)-BREAK(K,2)                                           VS  4878
      YD=BREAK(K,2)                                                     VS  4879
 2263 CONTINUE                                                          VS  4880
      IF(MA.EQ.2) HREF=HALFB(K)-YREF(K)                                 VS  4881
      IF(MA.EQ.2) YD=YREF(K)                                            VS  4882
 2261 CONTINUE                                                          VS  4883
      IF(NASYM.EQ.1) HREF=HALFB(K)                                      VS  4884
      IF(NASYM.EQ.1) YD=0.                                              VS  4885
      HTIP=HREF+YD                                                      VS  4886
      NJL=LL                                                            VS  4887
      IF(MA.EQ.2) NJL=LPN(K)                                            VS  4888
C       CHECKING THE LOCATION OF VORTEX BREAKDOWN                       VS  4889
      YY=(ABS(YLE(KCH))-YD)/HREF                                        VS  4890
      FF=1.                                                             VS  4891
      IF(YY.GT.YBAR(K,MA)) FF=RTK                                       VS  4892
      FDR=FF                                                            VS  4893
      IF(I.NE.NS(K)) GO TO 894                                          VS  4894
      IA=IWING(K)                                                       VS  4895
      IF(IA.EQ.0) IA=NS(K)                                              VS  4896
      RRT=1.                                                            VS  4897
      IF(CT(IA).GT.0.0001) RRT=ABS(CSU(IA)/CT(IA))                      VS  4898
      IF(RRT.GT.1.) RRT=1.                                              VS  4899
C     WRITE(JPT,2) RRT                                                  VS  4900
      CBMR(K)=RRT                                                       VS  4901
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  894 CONTINUE                                                          VS  4902
      AB1=ABD(K,MA)                                                     VS  4903
      AB2=ABDR(K,MA)                                                    VS  4904
      AB3=ABDL(K,MA)                                                    VS  4905
      IF(LAT.NE.1) GO TO 2264                                           VS  4906
      FBR=1.                                                            VS  4907
      FBL=1.                                                            VS  4908
      FRR=1.                                                            VS  4909
      FRL=1.                                                            VS  4910
      KX=0                                                              VS  4911
      YPL=1.                                                            VS  4912
      FPR=1.                                                            VS  4913
      YP=1.                                                             VS  4914
      YR=1.                                                             VS  4915
      FPL=1.                                                            VS  4916
      ID=0                                                              VS  4917
      IF(IAGVX.EQ.1.AND.MA.EQ.2) ID=1                                   VS  4918
      IF(IBD.EQ.0) GO TO 2266                                           VS  4919
C     EFFECT OF ROLLING ON VORTEX BREAKDOWN                             VS  4920
      YCC=YBB+(YLE(KCH)-YB)*COD                                         VS  4921
      ZCC=ZCP(MM+1)+ZB+(YLE(KCH)-YB)*SOD                                VS  4922
      PALP=P*(ZCC*SOD+YCC*COD)/HALFB(1)                                 VS  4923
      ALPP=ALP*COD                                                      VS  4924
      ALD1=ALPP+PALP                                                    VS  4925
      ALD2=ALPP-PALP                                                    VS  4926
      BLD1=ALD1                                                         VS  4927
      BLD2=ALD2                                                         VS  4928
      YCC=YBB+(HTIP-YB)*COD                                             VS  4929
      ZCC=ZCP(NJL)+ZB+(HTIP-YB)*SOD                                     VS  4930
      PA=P*(ZCC*SOD+YCC*COD)/HALFB(1)                                   VS  4931
      ALD1=ALPP+PA                                                      VS  4932
      ALD2=ALPP-PA                                                      VS  4933
      IF(MA.EQ.1) ABP1=ALD1                                             VS  4934
      IF(MA.EQ.1) ABP2=ALD2                                             VS  4935
      IF(MA.EQ.2) ABP3=ALD1                                             VS  4936
      IF(MA.EQ.2) ABP4=ALD2                                             VS  4937
      IF(I.NE.NS(K)) GO TO 2280                                         VS  4938
      GPR=1.                                                            VS  4939
      GPL=1.                                                            VS  4940
      IF(ALD1.GE.AB1) GPR=RTK                                           VS  4941
      IF(ALD2.GE.AB1) GPL=RTK                                           VS  4942
 2280 CONTINUE                                                          VS  4943
      YN1=YN(MM+1,1)                                                    VS  4944
      YN2=YN(MM+1,2)                                                    VS  4945
      IF(NASYM.EQ.1.AND.MA.EQ.1) YN1=ABS(YN(MM+1,2))                    VS  4946
      IF(NASYM.EQ.1.AND.MA.EQ.1) YN2=ABS(YN(MM+1,1))                    VS  4947
      YY1=(YN1-YD)/HREF                                                 VS  4948
      YY2=(YN2-YD)/HREF                                                 VS  4949
      YH1=YN1                                                           VS  4950
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      YH2=YN2                                                                   VS  4951
      IF(ALD1.LT.ALPBD(K,MA)) GO TO 2269                                        VS  4952
      IF(BLD1.LT.ALPBD(K,MA)) GO TO 2269                                        VS  4953
      ALD1=0.5*(ALD1+BLD1)                                                      VS  4954
      ALD1=(ALD1-ALPBD(K,MA))*180./PI                                           VS  4955
      DXTE=0.                                                                   VS  4956
      IF(ALD1.GT.0.) DXTE=BDPT(ALD1)                                            VS  4957
      YP=1.-DXTE                                                                VS  4958
      IF (YY2 .LE. YP) GO TO 2269                                               VS  4959
      IF (YY1 .GT. YP) FPR=RTK                                                  VS  4960
      IF (YY1 .LE. YP .AND. YY2 .GT. YP) FPR=1.-(1.-RTK)*(YY2-YP)/(YY2-YVS  4961
     1Y1)                                                                       VS  4962
 2269 IF(ALD2.LT.ALPBD(K,MA)) GO TO 2268                                        VS  4963
      IF(BLD2.LT.ALPBD(K,MA)) GO TO 2268                                        VS  4964
      ALD2=0.5*(ALD2+BLD2)                                                      VS  4965
      ALD2=(ALD2-ALPBD(K,MA))*180./PI                                           VS  4966
      DXTE=0.                                                                   VS  4967
      IF(ALD2.GT.0.) DXTE=BDPT(ALD2)                                            VS  4968
      YPL=1.-DXTE                                                               VS  4969
      IF (YY2 .LE. YPL) GO TO 2268                                              VS  4970
      IF (YY1 .GT. YPL) FPL=RTK                                                 VS  4971
      IF(YY1.LE.YPL.AND.YY2.GT.YPL) FPL=1.-(1.-RTK)*(YY2-YPL)/(YY2-YY1)         VS  4972
 2268 CONTINUE                                                                  VS  4973
C     EFFECT OF SIDESLIP ON VORTEX BREAKDOWN                                    VS  4974
      IF(YY.GT.YBRBR(K,MA)) FBR=RTBR                                            VS  4975
      IF(YY.GT.YBRBL(K,MA)) FBL=RTBL                                            VS  4976
      FSD=1.                                                                    VS  4977
      IF(ALP.GT.AB2.AND.ALP.LT.AB1) FSD=1.-(1.-PTBR)*(ALP-AB2)/(AB1-AB2)VS  4978
      IF(ALP.GE.AB1) FSD=RTBR                                                   VS  4979
      FSDL=1.                                                                   VS  4980
      IF(ALP.GE.AB3)FSDL=RTBL                                                   VS  4981
C     EFFECT OF YAWING ON VORTEX BREAKDOWN                                      VS  4982
      IFBL=0                                                                    VS  4983
      IFBR=0                                                                    VS  4984
      RK=RTBL                                                                   VS  4985
      BLR=-BR                                                                   VS  4986
      IF(PBK.GT.0.01) BLR=-BK-BR                                                VS  4987
      BB=BLR                                                                    VS  4988
      BLR=ABS(BLR)                                                              VS  4989
      BA1=ALPBD(K,MA)                                                           VS  4990
      BA2=ALBDBL(K,MA)                                                          VS  4991
      BA3=ALBDBR(K,MA)                                                          VS  4992
      GRL=BA1-(BA2-BA1)/BK*BB                                                   VS  4993
      IF(PBK.LT.0.01) GRL=BA1-(BA1-BA3)/BK*BB                                   VS  4994
      DRL=BA1+(BA2-BA1)/BK*BB                                                   VS  4995
      IF(PBK.GT.0.01) DRL=BA1+(BA1-BA3)/BK*BB                                   VS  4996
      ARL=GRL                                                                   VS  4997
      CRL=ARL                                                                   VS  4998
      BLR=(AUX(K,NB)-XREF)/HALFB(1)*RL                                          VS  4999
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C-3

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      IF(PBK.GT.0.01) BLR=-BK+BLR                                                    VS  5000
      AA=BLR                                                                         VS  5001
      BLR=ABS(BLR)                                                                   VS  5002
      ERL=BA1+(BA2-BA1)/BK*AA                                                        VS  5003
      HRL=BA1-(BA2-BA1)/BK*AA                                                        VS  5004
      IF(PBK.GT.0.01) ERL=BA1+(BA1-BA3)/BK*AA                                        VS  5005
      IF(PBK.LT.0.01) HRL=BA1-(BA1-BA3)/BK*AA                                        VS  5006
      ARL=HRL                                                                        VS  5007
      CRR=CRL                                                                        VS  5008
      YEY=ABS(YLE(KCH))                                                              VS  5009
      BZ=(ERL-DRL)/(HTIP-YEY)                                                        VS  5010
      BDR1=DRL+BZ*(YH1-YEY)                                                          VS  5011
      BDR2=DRL+BZ*(YH2-YEY)                                                          VS  5012
      BZ=(HRL-GRL)/(HTIP-YEY)                                                        VS  5013
      BDL1=GRL+BZ*(YH1-YEY)                                                          VS  5014
      BDL2=GRL+BZ*(YH2-YEY)                                                          VS  5015
      KX=0                                                                           VS  5016
      IF(MA.EQ.1) ABR2=ARL                                                           VS  5017
      IF(MA.EQ.1) ABR1=ERL                                                           VS  5018
      IF(MA.EQ.2) ABR3=ARL                                                           VS  5019
      IF(MA.EQ.2) ABR4=ERL                                                           VS  5020
      IF(ALP.GT.CRL.OR.ALP.GT.DRL) GO TO 2265                                        VS  5021
      IF(ALP.GT.ERL.OR.ALP.GT.HRL) GO TO 2265                                        VS  5022
      GO TO 2266                                                                     VS  5023
   20 CONTINUE                                                                       VS  5024
      DXTE=0.                                                                        VS  5025
      APD=(ALP-ARL)*180./PI                                                          VS  5026
      IF(ALP.GT.ARL) DXTE=BDPT(APD)                                                  VS  5027
       YR=1.-DXTE                                                                    VS  5028
      IF(YR.LT.0.) YR=0.                                                             VS  5029
      IF (YR .LT. YY1) YR=YY1                                                        VS  5030
      IF (YR .GT. YY2) YR=YY2                                                        VS  5031
      DXT=0.                                                                         VS  5032
      APD=(ALP-ARL1)*180./PI                                                         VS  5033
      IF (ALP .GT. ARL1) DXT=BDPT(APD)                                               VS  5034
      YR1=1.-DXT                                                                     VS  5035
      IF (YR1 .GT. YY2) YR1=YY2                                                      VS  5036
      IF (YR1 .LT. YY1) YR1=YY1                                                      VS  5037
      YR=0.5*(YR+YR1)                                                                VS  5038
      IF (YY2 .LE. YR) GO TO 23                                                      VS  5039
      RP=RTBR                                                                        VS  5040
      RM=1.                                                                          VS  5041
      IF (KX .EQ. 2) RP=RTBL                                                         VS  5042
      IF (KX .EQ. 1 .AND. PBK .GT. 0.01) RP=RTBL                                     VS  5043
      IF (KX .EQ. 1 .AND. YY1 .GT. YR) FRL=RP                                        VS  5044
      IF (KX .EQ. 2 .AND. YY1 .GT. YR) FRR=RP                                        VS  5045
      IF(YY1 .LE. YR .AND. YY2 .GT. YR) RM=1.-(1.-RP)*(YY2-YR)/(YY2-YY1)             VS  5046
      KY=0                                                                           VS  5047
      IF (YY1 .LE. YR .AND. YY2 .GT. YR) KY=1                                        VS  5048
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      IF (KY .EQ. 1 .AND. KX .EQ.1) FRL=RM                                    VS  5049
      IF (KY .EQ. 1 .AND. KX .EQ. 2) FRR=RM                                   VS  5050
      IF (PBK .LT. 0.01 .AND. KX .EQ. 1) RMM=(1.-RM)/(1.-RP)                  VS  5051
      IF (PBK .GT. 0.01 .AND. KX .EQ. 2) RMM=(1.-RM)/(1.-RP)                  VS  5052
                                                                              VS  5053
   23 CONTINUE                                                                VS  5054
      IF(KX.EQ.1) GO TO 21                                                    VS  5055
      GO TO 2266                                                              VS  5056
 2265 CONTINUE                                                                VS  5057
C     WRITE(JPT,2) HRL,GRL                                                    VS  5058
      IF(ALP.LT.HRL.AND.ALP.LT.BDL2) GO TO 21                                 VS  5059
      KX=1                                                                    VS  5060
      ARL=0.5*(BDL2+HRL)                                                      VS  5061
      ARL1=0.5*(BDL1+HRL)                                                     VS  5062
      GO TO 20                                                                VS  5063
   21 CONTINUE                                                                VS  5064
      IF(ALP.LT.ERL.AND.ALP.LT.DRL) GO TO 2266                                VS  5065
      KX=2                                                                    VS  5066
      ARL=0.5*(BDR1+ERL)                                                      VS  5067
      ARL1=0.5*(BDR2+ERL)                                                     VS  5068
      GO TO 20                                                                VS  5069
 2266 CONTINUE                                                                VS  5070
      IF (ABS(FPR-RTK) .GT. 0.01) GO TO 883                                   VS  5071
      IF (PBK .GT. 0.01 .AND. ABS(FRR-RTBL) .GT. 0.01) FRR=RTK                VS  5072
  883 CONTINUE                                                                VS  5073
      IF(ID.EQ.1) GO TO 882                                                   VS  5074
      GO TO 893                                                               VS  5075
  882 CONTINUE                                                                VS  5076
C       STRAKE EFFECT                                                         VS  5077
      IF(ALP.LE.ALBDBR(K,1)) FBR=1.                                           VS  5078
      IF(ABP1.LE.ALPBD(K,1)) FPR=1.                                           VS  5079
      IF(ALP.LE.ABR1) FRR=1.                                                  VS  5080
C     WRITE(JPT,2) ABP1,ABP2,ABP3,ABR1,ABR2,ABR3                              VS  5081
      IF(ALP.GT.ALBDBL(K,2).AND.ALP.LE.ALBDBL(K,1)) FBL=1.-(1.-FBL)*(ALPVS  5082
     1-ALBDBL(K,2))/(ALBDBL(K,1)-ALBDBL(K,2))                                 VS  5083
      IF(ABP2.GT.ALPBD(K,2).AND.ABP2.LE.ALPBD(K,1)) FPL=1.-(1.-FPL)*(ABPVS  5084
     12-ALPBD(K,2))/(ALPBD(K,1)-ALPBD(K,2))                                   VS  5085
      IF(ALP.GT.ABR3.AND.ALP.LE.ABR2) FRL=1.-(1.-FRL)*(ALP-ABP3)/(ABR2-  VS  5086
     1 ABR3)                                                                  VS  5087
  893 CONTINUE                                                                VS  5088
      IF(I.EQ.NS(K)) BML(4,K)=0.5*(GPR+GPL)                                   VS  5089
      IF(I.EQ.NS(K)) XL(1,K)=0.5*(FSD+FSDL)                                   VS  5090
      IF(I.EQ.NS(K)) CA(K)=FSDL                                               VS  5091
      IF(ABS(1.-FBR).GT.0.01) RAT=TQ*ABS(DMM(I))/CHORD                        VS  5092
      IF(ABS(1.-FRL).GT.0.01) RATR=TQ*ABS(DMM(I))/CHORD                       VS  5093
      IF(PBK.GT.0.01.AND.ABS(1.-FRR).GT.0.01) RATR=TQ*ABS(DMM(I))/CHORD  VS  5094
C     IF(I.EQ.NS(K)) WRITE(JPT,2) BML(4,K),XL(1,K),XL(2,K)                    VS  5095
 2264 CONTINUE                                                                VS  5096
      IF(I.EQ.NS(K)) CPCWL(K)=RRT                                             VS  5097
      IF(I.EQ.NS(K).AND.ALP.GE.AB1)CPCWL(K)=RTK*RRT
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C-3

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CML=0.                                                                  VS  5098
CLS(I)=0.                                                               VS  5099
CL(I)=0.                                                                VS  5100
CD(I)=0.                                                                VS  5101
PIC=PI/CHORD                                                            VS  5102
CLG1=0.                                                                 VS  5103
CDG1=0.                                                                 VS  5104
CMG1=0.                                                                 VS  5105
CYS=0.                                                                  VS  5106
CNS=0.                                                                  VS  5107
CLBS=0.                                                                 VS  5108
CLPS=0.                                                                 VS  5109
CLPVS=0.                                                                VS  5110
CYPS=0.                                                                 VS  5111
CNPS=0.                                                                 VS  5112
CYRS=0.                                                                 VS  5113
CLRS=0.                                                                 VS  5114
CNRS=0.                                                                 VS  5115
CNB1=0.                                                                 VS  5116
CYS1=0.                                                                 VS  5117
CLBS1=0.                                                                VS  5118
CYR1=0.                                                                 VS  5119
CNR1=0.                                                                 VS  5120
CLR1=0.                                                                 VS  5121
CLY(I)=0.                                                               VS  5122
CDPPS=0.                                                                VS  5123
CLPPS=0.                                                                VS  5124
CAXL=0.                                                                 VS  5125
CAVS(I)=0.                                                              VS  5126
NCW=NW(K,1)+NW(K,2)                                                     VS  5127
IF(LAT.NE.1) GO TO 2275                                                 VS  5128
IF(IQ.LE.MVRTX(K).AND.MVRTX(K).NE.0) GO TO 2275                         VS  5129
IF(BUX(K,NB).LE.AUX(K,NB)) GO TO 2275                                   VS  5130
DXR=AUX(K,NQ)-CRX(K,NQ)                                                 VS  5131
CRR=AUX(K,NB)-DXR                                                       VS  5132
XEE=CRR*(YEY-BREAK(K,NQ))/(YBREAK(K,NB)-BREAK(K,NQ))+DXR                VS  5133
IF(KY.EQ.0) DYB(K)=YYR                                                  VS  5134
IF(KY.EQ.1) GO TO 2272                                                  VS  5135
XE=XEE+ABS(RG)*TQ                                                       VS  5136
IF(XE.LT.AUX(K,NB)) GO TO 2271                                          VS  5137
KY=1                                                                    VS  5138
IF(YBA.LT.1.E-20)XBA=DXR                                                VS  5139
IF(YBA.LT.1.E-20)YBA=BREAK(K,NQ)                                        VS  5140
SY=YBA+(YLE(KCH)-YBA)*(AUX(K,NB)-XBA)/(XE-XBA)                          VS  5141
SB=SY                                                                   VS  5142
IF(SB.LT.0.) SB=0.                                                      VS  5143
DYB(K)=0.5*(YBREAK(K,NB)-SB)                                            VS  5144
SYB=SB                                                                  VS  5145
DBB=DYB(K)                                                              VS  5146
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      GO TO 2272                                                                VS  5147
 2271 XBA=XE                                                                    VS  5148
      YBA=YLE(KCH)                                                              VS  5149
      Q1=AUX(K,NB)-XE                                                           VS  5150
      Q2=CRR                                                                    VS  5151
      IF((Q1-Q2).LT.1.E-9) GO TO 2272                                           VS  5152
      IF(Q2.LT.1.E-5) GO TO 2272                                                VS  5153
      DL=YBREAK(K,NB)-BREAK(K,NO)-(YEY-BREAK(K,NO))/(1.-Q1/Q2)                  VS  5154
      SYB=YBREAK(K,NB)-DL                                                       VS  5155
      IF(SYB.LT.0.) SYB=0.                                                      VS  5156
      DBB=0.5*DL                                                                VS  5157
      DYB(K)=0.5*DL                                                             VS  5158
 2272 CONTINUE                                                                  VS  5159
      IF(KR.EQ.0) DYR(K)=DRR                                                    VS  5160
C     WRITE(JPT,2) XE,AUX(K,NB),SYB,DBB                                         VS  5161
      IF(KR.EQ.1) GO TO 2273                                                    VS  5162
      XE=XEE+ABS(RGR)*TO                                                        VS  5163
      IF(XE.LT.AUX(K,NB)) GO TO 2274                                            VS  5164
      KR=1                                                                      VS  5165
      IF(YBD.LT.1.E-20)XBD=DXR                                                  VS  5166
      IF(YBD.LT.1.E-20)YBD=BREAK(K,NO)                                          VS  5167
      SR=YBD+(YEY-YBD)*(AUX(K,NB)-XBD)/(XE-XBD)                                 VS  5168
      DYR(K)=YBREAK(K,NB)-SR                                                    VS  5169
      SRR=SR                                                                    VS  5170
      DYR(K)=0.5*DYR(K)                                                         VS  5171
      SYR=SRR                                                                   VS  5172
      GO TO 2273                                                                VS  5173
 2274 XBD=XE                                                                    VS  5174
      YBD=YLE(KCH)                                                              VS  5175
      Q1=AUX(K,NB)-XE                                                           VS  5176
      Q2=CRR                                                                    VS  5177
      IF((Q1-Q2).LT.1.E-9) GO TO 2273                                           VS  5178
      IF(Q2.LT.1.E-5) GO TO 2273                                                VS  5179
      DL=YBREAK(K,NB)-BREAK(K,NO)-(YEY-BREAK(K,NO))/(1.-Q1/Q2)                  VS  5180
      SYR=YBREAK(K,NB)-DL                                                       VS  5181
      IF(SYR.LT.0.) SYR=0.                                                      VS  5182
 2273 CONTINUE                                                                  VS  5183
      IF(KS.EQ.1) GO TO 2277                                                    VS  5184
      XE=XEE+ABS(DMM(I))                                                        VS  5185
      IF(XE.LT.AUX(K,NB)) GO TO 2276                                            VS  5186
      KS=1                                                                      VS  5187
      IF(YBC.LT.1.E-20)XBC=DXR                                                  VS  5188
      IF(YBC.LT.1.E-20)YBC=BREAK(K,NO)                                          VS  5189
      SB=YBC+(YEY-YBC)*(AUX(K,NB)-XBC)/(XE-XBC)                                 VS  5190
      SSB=SB                                                                    VS  5191
      IF(SSB.LT.0.) SSB=0.                                                      VS  5192
      DBY=0.5*(YBREAK(K,NB)-SB)                                                 VS  5193
      GO TO 2277                                                                VS  5194
 2276 XBC=XE                                                                    VS  5195
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      YBC=YLE(KCH)                                                          VS  5196
      DBY=DBB                                                               VS  5197
      Q1=AUX(K,NB)-XE                                                       VS  5198
      Q2=CRR                                                                VS  5199
      IF((Q1-Q2).LT.1.E-9) GO TO 2277                                       VS  5200
      IF(Q2.LT.1.E-5) GO TO 2277                                            VS  5201
      DL=YBREAK(K,NB)-BREAK(K,NO)-(YEY-BREAK(K,NO))/(1.-Q1/Q2)              VS  5202
      SSB=YBREAK(K,NB)-DL                                                   VS  5203
      IF(SSB.LT.0.) SSB=0.                                                  VS  5204
 2277 XAV=0.5*(AUX(K,NB)+BUX(K,NB))                                         VS  5205
      IF(ID.EQ.1.AND.ALP.LT.ALBDBR(K,1)) GO TO 2275                         VS  5206
      BRL=(AUX(K,NB)-XREF)/HALFB(1)*RL                                      VS  5207
      BRT=(XAV-XREF)/HALFB(1)*RL                                            VS  5208
      ALL=AB1-(AB1-AB2)/BK*BRT                                              VS  5209
      BLL=AB1-(AB1-AB2)/BK*BRL                                              VS  5210
      IF(BRL.LT.0.) BLL=AB1                                                 VS  5211
      ALL=0.5*(ALL+BLL)                                                     VS  5212
      IF(ALP.GT.BLL) SYR=SSB                                                VS  5213
      IF(ALP.GT.ALL.AND.ALP.LT.BLL) SYR=SYR+(ALP-ALL)*(SSB-SYR)/(BLL-       VS  5214
     1ALL)                                                                  VS  5215
      IF(ALP.GE.AB2.AND.SYB.GT.SSB) SYB=SYB+(ALP-AB2)*(SSB-SYB)/(AB1-AB2VS  5216
     1)                                                                     VS  5217
      IF(ALP.GE.AB1) SYB=SSB                                                VS  5218
 2275 CONTINUE                                                              VS  5219
C     WRITE(JPT,2) SYB,SYR,SSB,DBB,DYB(K),DP,DYR(K)                         VS  5220
C       CHORDWISE INTEGRATION                                               VS  5221
      DO 155 J=1,NCW                                                        VS  5222
      EPL=0.                                                                VS  5223
      NN=J+MM                                                               VS  5224
      IF (NW(K,2).EQ.0) GO TO 151                                           VS  5225
      IF(J.LE.NW(K,1)) GO TO 151                                            VS  5226
      IK=0                                                                  VS  5227
      IF(K.GT.1) IK=NS(K-1)                                                 VS  5228
      LL=LPAN1(K)+NW(K,2)*(I-IK-1)+NN-NW(K,1)*(I-IK)                        VS  5229
      IL=I1                                                                 VS  5230
      JLL=J-NW(K,1)                                                         VS  5231
      L=2                                                                   VS  5232
      FN=NW(K,2)                                                            VS  5233
      GO TO 152                                                             VS  5234
  151 LL=NN+JK                                                              VS  5235
      IL=KCH                                                                VS  5236
      JLL=J                                                                 VS  5237
      L=1                                                                   VS  5238
      FN=NW(K,1)                                                            VS  5239
  152 CONTINUE                                                              VS  5240
      ECM=0.                                                                VS  5241
      XC=(XV(LL)-XLE(KCH))/CHORD                                            VS  5242
      IF (ICAM(K).EQ.3) XC=XV(LL)                                           VS  5243
      Z1=XC                                                                 VS  5244
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      TSW=(XN(LL,2)-XN(LL,1))/(YN(LL,2)-YN(LL,1))                          VS  5245
      IF(IWING(K).NE.0.AND.I.GT.IWING(K)) GO TO 311                        VS  5246
      IF (IALP .EQ. 1) GO TO 305                                           VS  5247
      IF(K.EQ.1.AND.ICAMB.EQ.1) GO TO 1315                                 VS  5248
      CALL 7CR(XC,YV(LL),CAM,ICAM,Z1,K,1,CHORD,DZDY,IST,TSW)               VS  5249
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL) ) GO TO 300           VS  5250
      GO TO 296                                                            VS  5251
 1315 YC=YLE(KCH)                                                          VS  5252
      XCC=XC                                                               VS  5253
      XC=XV(LL)                                                            VS  5254
      CALL ZCDX (XC,YC,CAM,DZDY)                                           VS  5255
      Z1=YC                                                                VS  5256
      XC=XCC                                                               VS  5257
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 300            VS  5258
  296 EP=ALPH(I)                                                           VS  5259
      IF(NL.EQ.NAL(K).AND.MJW1(K,2,NL).EQ.0) GO TO 300                     VS  5260
      CS=COS(EP)                                                           VS  5261
      SS=SIN(EP)                                                           VS  5262
      GO TO 310                                                            VS  5263
  300 IF(NL.EQ.NAL(K)) EP=ALPH(I)                                          VS  5264
      IF (NL.NE.NAL(K)) EP=ALPH(I)-TELP(K,NL)                              VS  5265
      IF(NL.EQ.NAL(K)) EPL=-TELP(K,NL)                                     VS  5266
      IF(NASYM.EQ.1) EPL=-TELP(K,NL)                                       VS  5267
      IF(NL.NE.NAL(K)) ECM=TELP(K,NL)                                      VS  5268
      CS=COS(EP)                                                           VS  5269
      SS=SIN(EP)                                                           VS  5270
      GO TO 310                                                            VS  5271
  311 IF(IALP.EQ.1) GO TO 305                                              VS  5272
      CAM=0.                                                               VS  5273
      ICT=ICAMT(K)                                                         VS  5274
      IF(ICT.NE.0) CALL ZCR(XC,YV(LL),CAM,ICAM,Z1,K,ICT,CHORD,             VS  5275
     1DZDY,IST,TSW)                                                        VS  5276
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 300            VS  5277
      GO TO 296                                                            VS  5278
  305 CS=1.                                                                VS  5279
      SS=1.                                                                VS  5280
      CAM=0.                                                               VS  5281
  310 CONTINUE                                                             VS  5282
      AXCAM=CAM+ECM                                                        VS  5283
      U1=0.                                                                VS  5284
      U2=0.                                                                VS  5285
      V1=0.                                                                VS  5286
      V2=0.                                                                VS  5287
      IF (NGRD .EQ. 0) GO TO 512                                           VS  5288
      ZCW=-2.*(ZN(LL,1)+ZB+(YCP(LL)-YB)*SOD+HEIGHT)+ZN(LL,1)+ZB+(YCP(LL)VS  5289
                                                                           VS  5290
     1-YB)*SOD                                                             VS  5291
      CALL BACKWH(XV(LL),YV(LL),ZCW,LPANEL,B,LPAN1,NW,CP,U1,LAT,COD,SOD,VS  5292
     1YBREAK,DCOS,DSIN,V1,IWING,ZB,YB,YBB,NCSS,IWGLT,IV,NC1,KF,BREAK)      VS  5293
      IF(LAT.NE.(-1)) GO TO 512
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      CALL BACKWH(XV(LL),YV(LL),ZCW,LPANEL,B,LPAN1,NW,GAMMA,U2,LAT,COD, VS   5294
     1SOD,YBREAK,DCOS,DSIN,V2,IWING,ZB,YR,YRB,NCSS,IWGLT,IV,NC1,KF,BREAKVS   5295
     2)                                                                VS   5296
  512 CONTINUE                                                         VS   5297
      IF (IALP .EQ. 0) GO TO 513                                       VS   5298
      GAK=CP(LL)*(1.+U1*ALP)+CP(LL)*ALP*U1-GAMX(LL)*(V1*ALP+SOD*ALP)*2. VS   5299
      GBK=GAMMA(LL)                                                    VS   5300
      CP(LL)=GAK                                                       VS   5301
      GO TO 514                                                        VS   5302
  513 CONTINUE                                                         VS   5303
      ST=SQRT(1.+DZDY*DZDY)                                            VS   5304
      SD=SOD/ST+DZDY/ST*COD                                            VS   5305
      CK=CS                                                            VS   5306
      CS=(CAM*SS+CK)/SQRT(1.+CAM*CAM)                                  VS   5307
      PCA=0.                                                           VS   5308
      IF (COD.GT..98) PCA=GAMX(LL)*(V1+SD*SNALP(I))                    VS   5309
      GAK=CP(LL)*(1.+U1)*CS-PCA                                        VS   5310
      GBK=GAMMA(LL)*(1.+U1+U2)*CS-GAMX(LL)*(V2+V1)                     VS   5311
      CP(LL)=GAK                                                       VS   5312
      CS=CK                                                            VS   5313
      GAMMA(LL)=GBK                                                    VS   5314
  514 CONTINUE                                                         VS   5315
      GBS=GAK*SN(K,JLL,L)*CH(IL)/FN                                    VS   5316
      WBS=GBK*SN(K,JLL,L)*CH(IL)/FN                                    VS   5317
      WAS=0.                                                           VS   5318
      FT=SQRT((1.+CAM*CAM)*COD*COD+(SOD+DZDY*COD)**2)                  VS   5319
      PL=(CAM*SS+CS)*COD/FT                                            VS   5320
      PD=(-CAM*CS+SS)*COD/FT                                           VS   5321
      PM=(XV(LL)+Z1*CAM-XREF)*COD/FT                                   VS   5322
      CL(I)=CL(I)+GBS*PL                                               VS   5323
      CD(I)=CD(I)+GBS*PD                                               VS   5324
      CML=CML-GBS*PM                                                   VS   5325
      CLPPS=CLPPS+GBS*PL                                               VS   5326
      CDPPS=CDPPS+GBS*PD                                               VS   5327
      WGS=CPAUG(LL)*SN(K,JLL,L)*CH(IL)/FN                              VS   5328
      CLG1=CLG1+WGS*PL                                                 VS   5329
      CDG1=CDG1+WGS*PD                                                 VS   5330
      CMG1=CMG1-WGS*PM                                                 VS   5331
      CLS(I)=CLS(I)+WBS                                                VS   5332
      CLY(I)=CLY(I)+GBS*CS                                             VS   5333
      CAXL=CAXL+GBS*(-AXCAM)*COD/FT                                    VS   5334
      IF(LAT.EQ.0) GO TO 155                                           VS   5335
      FZ=SN(K,JLL,L)*CH(IL)/FN                                         VS   5336
      IF(LAT.EQ.(-1)) GO TO 1353                                       VS   5337
      WP=GAMP(LL)*FZ*(1.+U1)                                           VS   5338
      WB=GAMB(LL)*FZ*(1.+U1)                                           VS   5339
      WR=GAMR(LL)*FZ*(1.+U1)                                           VS   5340
      FBC=1.                                                           VS   5341
      IF(YCP(LL).GT.SYB.OR.YY.GT.YBAR(K,MA)) FBC=0.                    VS   5342
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      FWB=1.                                                                    VS  5343
      IF(XC.LT.RAT.AND.XV(LL).LT.AUX(K,NB)) FWB=0.                              VS  5344
      IF(YN(LL,1).GT.SYB.AND.XV(LL).GT.AUX(K,NB)) FWB=0.                        VS  5345
      IF(SYB.GT.YN(LL,1).AND.SYB.LT.YN(LL,2)) GO TO 521                         VS  5346
      GO TO 522                                                                 VS  5347
  521 IF(XV(LL).LE.AUX(K,NB)) GO TO 522                                         VS  5348
      FWB=(SYB-YN(LL,1))/(YN(LL,2)-YN(LL,1))                                    VS  5349
  522 CONTINUE                                                                  VS  5350
      FWB=ABS(FWB)                                                              VS  5351
      WBB=GAMB(LL)*FZ*(1.+U1)*FWB                                               VS  5352
      FWR=1.                                                                    VS  5353
      IF(XC.LT.RATR.AND.XV(LL).LT.AUX(K,NB)) FWR=0.                             VS  5354
      IF(YN(LL,1).GT.SYR.AND.XV(LL).GT.AUX(K,NB)) FWR=0.                        VS  5355
      IF(SYR.GT.YN(LL,1).AND.SYR.LT.YN(LL,2)) GO TO 523                         VS  5356
      GO TO 524                                                                 VS  5357
  523 IF(XV(LL).LE.AUX(K,NB)) GO TO 524                                         VS  5358
      FWR=(SYR-YN(LL,1))/(YN(LL,2)-YN(LL,1))                                    VS  5359
  524 CONTINUE                                                                  VS  5360
      FWR=ABS(FWR)                                                              VS  5361
      WRR=GAMR(LL)*FZ*(1.+U1)*FWR                                               VS  5362
 1353 CONTINUE                                                                  VS  5363
      P1=DZDY*COD+SOD                                                           VS  5364
      YCV=P1*(XV(LL)-XREF)/FT                                                   VS  5365
      ZCV=P1*(ZCP(LL)+ZB+(YCP(LL)-YB)*SOD)+COD*(YBB+(YCP(LL)-YR)*COD)           VS  5366
      ZCV=ZCV/FT                                                                VS  5367
      IF(LAT.EQ.1) GO TO 1354                                                   VS  5368
      EPP=EPL                                                                   VS  5369
      EPL=EPL-CAM                                                               VS  5370
      IF(NASYM.EQ.1) WBS=GBS                                                    VS  5371
      CLBS=CLBS-WBS*ZCV*COS(EPL)                                                VS  5372
      CNS=CNS+WBS*YCV+GBS*SIN(EPP)*YLF(KCH)*COD/FT                              VS  5373
      GO TO 155                                                                 VS  5374
 1354 CONTINUE                                                                  VS  5375
      CYS=CYS-WB*P1/FT-GBS*(-CAM*CS+SS)*COD/FT*BK*COSA                          VS  5376
      CNS=CNS+WR*YCV+GBS*(-CAM*CS+SS)*COD/FT*BK*(XV(LL)-XREF)*COSA              VS  5377
      CLBS=CLBS-WB*ZCV                                                          VS  5378
      CYPS=CYPS-WP*P1/FT                                                        VS  5379
      CLPS=CLPS-WP*ZCV                                                          VS  5380
      CNPS=CNPS+WP*YCV                                                          VS  5381
      CYRS=CYRS-WR*P1/FT+GBS*SS*(XV(LL)-XREF)/HALFB(1)*COD/FT*RL                VS  5382
      CLRS=CLRS-WR*ZCV                                                          VS  5383
      CNRS=CNRS+WR*YCV-GBS*SS*(XV(LL)-XREF)/HALFB(1)*COD/FT*RL*(XV(LL)-         VS  5384
     1XREF)                                                                     VS  5385
      CLPVS=CLPVS-(WP-GBS/CS*P*ZCV*SINA/HALFB(1))*ZCV                           VS  5386
      CNB1=CNB1+WBB*YCV                                                         VS  5387
      GBS=GBS*FBC                                                               VS  5388
      CYS1=CYS1-WBB*P1/FT-GBS*(-CAM*CS+SS)*COD/FT*BK*COSA                       VS  5389
      CLBS1=CLBS1-WBB*ZCV                                                       VS  5390
      CYR1=CYR1-WRR*P1/FT                                                       VS  5391
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      CNR1=CNR1+WRR*YCV                                                  VS  5392
      CLR1=CLR1-WRR*ZCV                                                  VS  5393
      CNB1=CNB1+GBS*(-CAM*CS+SS)*COD/FT*BK*(XV(LL)-XREF)*COSA            VS  5394
  155 CONTINUE                                                           VS  5395
C       END OF CHORDWISE INTEGRATION                                     VS  5396
      DZDY=0.                                                            VS  5397
      TSW=SIN(SWEEP(KCH))/COS(SWEEP(KCH))                                VS  5398
      IF (IALP .EQ. 1) GO TO 316                                         VS  5399
      IF(IWING(K).NE.0.AND.I.GT.IWING(K)) GO TO 320                      VS  5400
      IF(K.EQ.1.AND.ICAMB.EQ.1) GO TO 1325                               VS  5401
      XC = 0.                                                            VS  5402
      IF(ICAM(K).EQ.3) XC=XLE(KCH)                                       VS  5403
      Z1=XC                                                              VS  5404
      CALL ZCR(XC,YLE(KCH),CAMLE,ICAM,Z1,K,1,CHORD,DZDY,IST,TSW)         VS  5405
      IF(NLEF(K).EQ.0) GO TO 318                                         VS  5406
      IF (LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 315         VS  5407
      GO TO 318                                                          VS  5408
  315 CAMLE=CAMLE+TFLP(K,NL)                                             VS  5409
      GO TO 318                                                          VS  5410
 1325 YC=YLE(KCH)                                                        VS  5411
      XC=XLE(KCH)                                                        VS  5412
      CALL ZCDX(XC,YC,CAMLE,DZDY)                                        VS  5413
      Z1=YC                                                              VS  5414
  318 EP=ALPH(I)                                                         VS  5415
      XCS=COS(EP)                                                        VS  5416
      XSS=SIN(EP)                                                        VS  5417
      GO TO 317                                                          VS  5418
  316 XCS=1.                                                             VS  5419
      XSS=0.                                                             VS  5420
      CAMLE=0.                                                           VS  5421
      GO TO 317                                                          VS  5422
  320 CAMLE=0.                                                           VS  5423
      ICT=ICAMT(K)                                                       VS  5424
      IF(ICT.NE.0) CALL ZCR(XC,YLE(KCH),CAMLE,ICAM,Z1,K,ICT,             VS  5425
     1CHORD,DZDY,IST,TSW)                                                VS  5426
      XCS=COS(ALPH(I))                                                   VS  5427
      XSS=SIN(ALPH(I))                                                   VS  5428
      IF(NLEF(K).EQ.0) GO TO 317                                         VS  5429
      IF(LL.GE.MJW1(K,JZ,NL).AND.LL.LE.MJW2(K,JZ,NL)) GO TO 295          VS  5430
      GO TO 317                                                          VS  5431
  295 CAMLE=CAMLE+TFLP(K,NL)                                             VS  5432
  317 CONTINUE                                                           VS  5433
      CAMY=DZDY                                                          VS  5434
      DZDY=0.                                                            VS  5435
      IF(ICAM(K).LE.1) Z1=0.                                             VS  5436
      F1=SQRT(1.+CAMLE**2)                                               VS  5437
      F2=SQRT((1.+FTAN*FTAN)*COD*COD+(CAMLE*FTAN+SOD)**2)                VS  5438
      F12=F1*F2                                                          VS  5439
      F3=COD*COD+CAMLE*(CAMLE*FTAN+SOD)                                  VS  5440
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      F4=-CAMLE*COD+FTAN*SOD*COD                                        VS  5441
      IF(ABS(COD).GT.0.1)F5=F12/SQRT(F3*F3+F4*F4)                       VS  5442
      IF(ABS(COD).LE.0.1)F5=1./FS                                       VS  5443
      FT=SQRT(1.+CAMLE**2)                                              VS  5444
      FL=XSS-XCS*CAMLE                                                  VS  5445
      FD=-XCS-XSS*CAMLE                                                 VS  5446
      CLPPS=CLPPS*PI/CHORD+BMR(1,I)*FL/FT                               VS  5447
      CL(I)=CL(I)*PI/CHORD+CT(I)*FL/FT                                  VS  5448
      CM(I)=CML*PI/(CREF*CHORD)                                         VS  5449
      DIFF=BMR(1,I)-BML(1,I)                                            VS  5450
      IF(DIFF.LT.0.) DIFF=0.                                            VS  5451
C     BMR(1,I)=REMAINING L.E.THRUST                                     VS  5452
C     DIFF=REMAINING THRUST-L.E.DRAG                                    VS  5453
      CDPPS=CDPPS*PI/CHORD+DIFF*FD/FT                                   VS  5454
      CD(I)=CD(I)*PI/CHORD+CT(I)*FD/FT                                  VS  5455
      CLS(I)=CLS(I)*PI/CHORD                                            VS  5456
      CLY(I)=CLY(I)*PI/CHORD+CT(I)*FL/FT                                VS  5457
      CAXL=CAXL*PIC                                                     VS  5458
      CLG1=CLG1*PIC                                                     VS  5459
      CDG1=CDG1*PIC                                                     VS  5460
      CMG1=CMG1*PIC/CREF                                                VS  5461
      IF(LAT.EQ.0) GO TO 220                                            VS  5462
      CONST=PI/CHORD                                                    VS  5463
      CTH=PI/2.*SQRT(1.-AM*AM*FS*FS)/FS                                 VS  5464
      IF(LAT.EQ.(-1)) GO TO 1355                                        VS  5465
      FBSR=FF                                                           VS  5466
      FBSL=FF                                                           VS  5467
      FRSR=1.                                                           VS  5468
      FRSL=1.                                                           VS  5469
      IF(YY.GT.YBPBR(K,MA)) FBSR=RTK                                    VS  5470
      IF(YY.GT.YBPBL(K,MA)) FBSL=RTK                                    VS  5471
      FRSR=FRR                                                          VS  5472
      IF (ABS(FPR-RTK) .GT. 0.01) GO TO 887                             VS  5473
      IF (PBK .LT. 0.01 .AND. ABS(FRR-RTBL) .GT. 0.01) FRR=RTBR         VS  5474
  887 CONTINUE                                                          VS  5475
      RT=1.                                                             VS  5476
      IF (RTBL .LT. 1.) RT=1.-(1.-RTK)*(1.-FRL)/(1.-RTBL)               VS  5477
      IF ((1.-FRL) .GT. 0.01) FRSL=RT                                   VS  5478
      IF(MA.EQ.1) FZ7=FF                                                VS  5479
      IF(MA.EQ.1) FR1=FRR                                               VS  5480
      IF(MA.EQ.1) FP1=FPL                                               VS  5481
      IF (PBK .LT. 0.01) GO TO 888                                      VS  5482
      IF (ABS(FRR-RTBL) .LT. 0.01) FRSL=RTK                             VS  5483
      IF (ABS(FRL-RTBL) .LT. 0.01) FRSR=RTK                             VS  5484
      IF (ABS(FPR-RTK) .GT. 0.01) GO TO 889                             VS  5485
      RO=1.                                                             VS  5486
      IF (RTBL .LT. 1.) RO=1.-(1.-RTK)*(1.-FRR)/(1.-RTBL)               VS  5487
      IF ((FRR-RTBL) .GT. 0.01) FRSR=RO                                 VS  5488
      GO TO 889                                                         VS  5489
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888 IF (ABS(FRR-RTBL) .LT. 0.01) FRSR=FRR                          VS  5490
    IF (ABS(FRL-RTBR) .LT. 0.01) FRSL=FRL                          VS  5491
    IF(F7Z.GT.0.95) GO TO 889                                      VS  5492
    FRSR=FRSR*FR1                                                  VS  5493
    FRSL=FRSL*FP1                                                  VS  5494
889 CONTINUE                                                       VS  5495
    IF(ID.EQ.0) GO TO 892                                          VS  5496
    FBSR=1.                                                        VS  5497
    FBSL=1.                                                        VS  5498
    FRSR=1.                                                        VS  5499
    FRSL=1.                                                        VS  5500
892 CONTINUE                                                       VS  5501
    CYS=CYS*CONST                                                  VS  5502
    CNS=CNS*CONST                                                  VS  5503
    CLBS=CLBS*CONST                                                VS  5504
    CYPS=CYPS*CONST                                                VS  5505
    CNPS=CNPS*CONST                                                VS  5506
    CLPS=CLPS*CONST                                                VS  5507
    CYRS=CYRS*CONST                                                VS  5508
    CNRS=CNRS*CONST                                                VS  5509
    CLRS=CLRS*CONST                                                VS  5510
    CLPVS=CLPVS*CONST                                              VS  5511
    CNR1=CNR1*CONST                                                VS  5512
    CYS1=CYS1*CONST                                                VS  5513
    CLBS1=CLBS1*CONST                                              VS  5514
    CYR1=CYR1*CONST                                                VS  5515
    CNR1=CNR1*CONST                                                VS  5516
    CLR1=CLR1*CONST                                                VS  5517
    SUM1=Y(2,I)*Y(2,I)                                             VS  5518
    SUM2=Y(3,I)*Y(3,I)                                             VS  5519
    SUM3=Y(4,I)*Y(4,I)                                             VS  5520
    SM11=Y(1,I)+Y(2,I)                                             VS  5521
    SM12=Y(1,I)-Y(2,I)                                             VS  5522
    SM21=Y(1,I)+Y(3,I)                                             VS  5523
    SM22=Y(1,I)-Y(3,I)                                             VS  5524
    SM31=Y(1,I)+Y(4,I)                                             VS  5525
    SM32=Y(1,I)-Y(4,I)                                             VS  5526
    IF(SM11.GE.0. .AND. SM12.GE.0.) SUM1=0.                        VS  5527
    IF(SM11.LT.0. .AND.SM12.LT.0.) SUM1=0.                         VS  5528
    IF(SM21.GE.0. .AND. SM22.GE.0.) SUM2=0.                        VS  5529
    IF(SM21.LT.0. .AND. SM22.LT.0.) SUM2=0.                        VS  5530
    IF(SM31.GE.0. .AND. SM32.GE.0.) SUM3=0.                        VS  5531
    IF(SM31.LT.0. .AND. SM32.LT.0.) SUM3=0.                        VS  5532
    S21=1.                                                         VS  5533
    S22=1.                                                         VS  5534
    S23=1.                                                         VS  5535
    IF (SM11.LT.0.) S21=-1.                                        VS  5536
    IF (SM21.LT.0.) S22=-1.                                        VS  5537
    IF (SM31.LT.0.) S23=-1.                                        VS  5538
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      PBETA=2.*Y(1,I)*FTAN*GB*Y(2,I)*PBK                                VS  5539
      PRL=0.                                                            VS  5540
      SIDE=CTH*(2.*Y(1,I)*Y(2,I)+SUM1)*S21*F5                           VS  5541
      SIDEP=SIDE                                                        VS  5542
      SIDE=SIDE*(FPR+FPL)*0.5                                           VS  5543
      SIDEPB=CTH*(PBETA+PRL)*F5*(FPR+FPL)*0.5                           VS  5544
      SIDEB=CTH*(2.*Y(1,I)*Y(3,I)+SUM2)*S22*F5                          VS  5545
      SIDBB=SIDEB                                                       VS  5546
      SIDER=CTH*(2.*Y(1,I)*Y(4,I)+SUM3)*S23*F5                          VS  5547
      SIDRR=SIDER                                                       VS  5548
      FCRL=0.5*(FRSR+FRSL)                                              VS  5549
      FBU=1.                                                            VS  5550
      FBUL=1.                                                           VS  5551
      IF(ALP.GT.AB2.AND.ALP.LT.AB1)FBU=1.-(1.-RTK)*(ALP-AB2)/(AB1-AB2)  VS  5552
      IF(ALP.GE.AB1) FBU=RTK                                            VS  5553
      IF(ALP.GE.AB3) FBUL=RTK                                           VS  5554
      IF(I.EQ.NS(K)) BMR(4,K)=0.5*(FBU+FBUL)                            VS  5555
      IF(I.EQ.NS(K))BMR(5,K)=0.5*(FRSR+1.)*RRT                          VS  5556
      SIDER=SIDER-2.*RL*YLE(KCH)/HALFB(1)*CSU(I)*FCRL                   VS  5557
      SIDRPB=0.                                                         VS  5558
      FDRL=0.5*(FRL+FRR)                                                VS  5559
      IF(PBK.GT.0.01) SIDRPB=CTH*2.*Y(1,I)*FTAN*GB*Y(4,I)*PBK*F5*FDRL   VS  5560
      SRG=DMM(I)*2.*GB/CHORD                                            VS  5561
      RRG=DMM(I)*2.*BR/CHORD                                            VS  5562
      SIRR=SIDER+RRG*FRSR                                               VS  5563
      SIRL=SIDER+RRG*FRSL                                               VS  5564
      SIDR1=(SIRR*FRR+SIRL*FRL)*0.5                                     VS  5565
      SIBR=SIDEB+SRG*FBSR                                               VS  5566
      SIBL=SIDEB+SRG*FBSL                                               VS  5567
      SIDB1=(SIBR*FBR+SIBL*FBL)*0.5                                     VS  5568
      ER=1.                                                             VS  5569
      EL=1.                                                             VS  5570
      IF(FRR.LT.0.95) ER=0.                                             VS  5571
      IF(FRL.LT.0.95) EL=0.                                             VS  5572
      IF(PBK.GT.0.01) SIDR1=SIDR1+(SIBR*(1.-FBR)*ER+SIBL*(1.-FBL)*EL)   VS  5573
                                                                        VS  5574
     1 *0.5                                                             VS  5575
C     WRITE(JPT,2) SIDEB,SIDB1,SIDER,SIDR1,FBR,FBL,FPR,FRL              VS  5576
C     WRITE(JPT,2) FRSR,FRSL,FCRL,SIDRPB,FPR,FPL                        VS  5577
C     ADDITIONAL VORTEX LIFT ON THE LEFT OUTBOARD PANEL                 VS  5578
      FBB=1.                                                            VS  5579
      IY=1                                                              VS  5580
      IF (IAGVX.NE.0) IY=MA                                             VS  5581
      IF(ID.EQ.1.AND.ALP.LT.ALBDBR(K,1)) GO TO 1355                     VS  5582
      IF(ALP.GE.ALPBD(K,IY).AND.ALP.LE.ALBDBL(K,IY)) FBB=1.-(1.-RTBL)*  VS  5583
     1(ALP-ALPBD(K,IY))/(ALBDBL(K,IY)-ALPBD(K,IY))                      VS  5584
      IF(ALP.GT.ALBDBL(K,IY)) FBB=RTBL                                  VS  5585
      FBB=FBB*RTBL                                                      VS  5586
      IF(MA.EQ.1.AND.YY.GT.YBRBL(K,1)) FBB=0.                           VS  5587
      IF(ID.EQ.1.AND.ALP.GE.ALBDBL(K,1)) FBB=0.
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      FBC=FBB                                                                    VS   5588
      IF(MA.EQ.2.AND.IAGVX.EQ.0) FBC=0.                                          VS   5589
      SIDB1=SIDB1+0.5*(FBC-FBL*FBSL*FBB)*SRG -0.5*(1.-FF)*CSU(I)*FBB             VS   5590
C     WRITE(JPT,2) SIDE,SIDB1,SIDR1,FBB                                          VS   5591
 1355 CONTINUE                                                                   VS   5592
      YE=YBB+(YLE(KCH)-YB)*COD                                                   VS   5593
      KA=LL                                                                      VS   5594
      ZYE=SOD*(ZCP(KA)+ZB+(YLE(KCH)-YB)*SOD)+COD*(YBB+(YLE(KCH)-YB)*COD)VS   5595
      F6=(CAMLE*COD*(CAMLE*TAN*COD+SOD)+TAN*COD*COD)/F12                         VS   5596
      FD=FD*COD                                                                  VS   5597
      IF(LAT.EQ.1) GO TO 1356                                                    VS   5598
      S1=1.                                                                      VS   5599
      IF(Y(1,I).LT.0.) S1=-1.                                                    VS   5600
      S2=1.                                                                      VS   5601
      IF(NASYM.EQ.1) GO TO 1365                                                  VS   5602
      IF((Y(1,I)+GAMP(I)).LT.0.) S2=-1.                                          VS   5603
      SUM=GAMP(I)*GAMP(I)                                                        VS   5604
      SM1=Y(1,I)+GAMP(I)                                                         VS   5605
      SM2=Y(1,I)-GAMP(I)                                                         VS   5606
      IF(SM1.GE.0..AND.SM2.GE.0.) SUM=0.                                         VS   5607
      IF(SM1.LT.0..AND.SM2.LT.0.) SUM=0.                                         VS   5608
      SIDE=CTH*(2.*Y(1,I)*GAMP(I)+SUM)*S2*F5                                     VS   5609
 1365 CONTINUE                                                                   VS   5610
      IF(NASYM.EQ.1) SIDE=CTH*Y(1,I)*Y(1,I)*S1*F5                                VS   5611
      CLB1=CLBS*CONST-SIDE*ZYE/F1                                                VS   5612
      CNB1=CNS*CONST+SIDE*SOD*(XLE(KCH)-XREF)                                    VS   5613
      CLBS=CLBS*CONST-SIDE*ZYE*F4/F12                                            VS   5614
      CNS=CNS*CONST-SIDE*(YE*F3/F12+(XLE(KCH)-XREF)*F6)                          VS   5615
      IF(IQ.GE.NVRTX(K).AND.NVRTX(K).NE.0) GO TO 253                             VS   5616
      IF(IQ.LE.NVRTX(K).AND.NVRTX(K).NE.0) GO TO 253                             VS   5617
      GO TO 220                                                                  VS   5618
  253 CLB1=CLBS                                                                  VS   5619
      CNB1=CNS                                                                   VS   5620
      GO TO 220                                                                  VS   5621
 1356 CONTINUE                                                                   VS   5622
      YYP=ABS(SIDEP)*CHORD*SSN                                                   VS   5623
      YYPR=0.                                                                    VS   5624
      YYB=ABS(SIDBB)*CHORD*GRC                                                   VS   5625
      YYR=ABS(SIDRR)*CHORD*SSN                                                   VS   5626
      IF(PBK.GT.0.01) YYP=ABS(SIDEP+SIDBB)*CHORD*SSN                             VS   5627
      IF(PBK.GT.0.01) YYR=ABS(SIDBB+SIDRR)*CHORD*SSN                             VS   5628
      RP=DMM(I)                                                                  VS   5629
      IF(RP.GT.CHORD) RP=CHORD                                                   VS   5630
      DXPP=RP*FS*SSN                                                             VS   5631
      IF(YYP.GT.DXPP) YYP=DXPP                                                   VS   5632
      IF(YYR.GT.DXPP) YYR=DXPP                                                   VS   5633
      IF(DRR.LT.YYR) DRR=YYR                                                     VS   5634
      IF(IRL.EQ.1.AND.YYR.LT.YYP) YYR=YYP                                        VS   5635
      IF(DR.LT.YYP) DR=YYP                                                       VS   5636
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      IF(I.EQ.NS(K)) BML(5,K)=DR                                                VS  5637
      YEP=SOD*(ZCP(KA)+ZB+(YLE(KCH)-YYP-YB)*SOD)+COD*(YBB+(YLE(KCH)-YYP VS  5638
                                                                                VS  5639
     1-YB)*COD)
      YEB=SOD*(ZCP(KA)+ZB+(YLE(KCH)-YYB-YB)*SOD)+COD*(YBB+(YLE(KCH)-YYB VS  5640
                                                                                VS  5641
     1-YB)*COD)
      YER=SOD*(ZCP(KA)+ZB+(YLE(KCH)-YYR-YB)*SOD)+COD*(YBB+(YLE(KCH)-YYR VS  5642
                                                                                VS  5643
     1-YB)*COD)
      YEPB=SOD*(ZCP(KA)+ZB+(YLE(KCH)-YYPB-YB)*SOD)+COD*(YBB+(YLE(KCH)-  VS  5644
                                                                                VS  5645
     1YYPB-YB)*COD)
      CYB1=CYS1-SIDB1*SOD/F1                                                    VS  5646
      CNB1=CNB1+SIDB1*SOD*(XLE(KCH)-XREF)                                       VS  5647
      CLB1=CLBS1-SIDB1*YEB/F1                                                   VS  5648
      CYP1=CYPS-(SIDE+SIDEPB)*SOD/F1                                            VS  5649
      CNP1=CNPS+(SIDE+SIDEPB)*SOD*(XLE(KCH)-XREF)                               VS  5650
      CLPVS=CLPVS-SIDE*YEP/F1-SIDEPB*YEPB/F1                                    VS  5651
      CPCVS=(SIDE+SIDEPB)/F1                                                    VS  5652
      CRCVS=(SIDER+SIDRPB)/F1                                                   VS  5653
      CBCVS=SIDB1/F1                                                            VS  5654
      CYR1=CYR1-(SIDR1+SIDRPB)*SOD/F1                                           VS  5655
      CNR1=CNR1+(SIDR1+SIDRPB)*SOD*(XLE(KCH)-XREF)                              VS  5656
      CLR1=CLR1-SIDR1*YER/F1-SIDRPB*YEPB/F1                                     VS  5657
      SIDE=SIDEP                                                                VS  5658
      CYPS=CYPS+SIDE*F6                                                         VS  5659
      CNPS=CNPS-SIDE*YE*F3/F12                                                  VS  5660
      CNPS=CNPS-SIDE*(XLE(KCH)-XREF)*F6                                         VS  5661
      CLPS=CLPS-SIDE*ZYE*F4/F12                                                 VS  5662
      CYS=CYS+SIDEB*F6-CT(I)*FD/FT*BK                                           VS  5663
      CNS=CNS-SIDEB*YE*F3/F12+CT(I)*FD/FT*BK*(XLE(KCH)-XREF)                    VS  5664
      CNS=CNS-SIDEB*(XLE(KCH)-XREF)*F6                                          VS  5665
      CLBS=CLBS-SIDEB*ZYE*F4/F12                                                VS  5666
      CYRS=CYRS+SIDER*F6+CT(I)*FD/FT*(XLE(KCH)-XREF)/HALFB(1)*RL                VS  5667
      CNRS=CNRS-SIDER*YE*F3/F12-CT(I)*FD/FT*(XLE(KCH)-XREF)/HALFB(1)*RL*VS  5668
                                                                                VS  5669
     1(XLE(KCH)-XREF)
      CNRS=CNRS-SIDER*(XLE(KCH)-XREF)*F6                                        VS  5670
      CLRS=CLRS-SIDER*ZYE*F4/F12                                                VS  5671
      IF(IQ.GE.NVRTX(K).AND.NVRTX(K).NE.0) GO TO 250                            VS  5672
      IF(IQ.LE.MVRTX(K).AND.MVRTX(K).NE.0) GO TO 250                            VS  5673
      GO TO 251                                                                 VS  5674
  250 CYB1=CYS                                                                  VS  5675
      CNB1=CNS                                                                  VS  5676
      CLB1=CLBS                                                                 VS  5677
      CYP1=CYPS                                                                 VS  5678
      CNP1=CNPS                                                                 VS  5679
      CLPVS=CLPS                                                                VS  5680
      CYR1=CYRS                                                                 VS  5681
      CNR1=CNRS                                                                 VS  5682
      CLR1=CLPS                                                                 VS  5683
  251 CONTINUE                                                                  VS  5684
  220 CONTINUE                                                                  VS  5685
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      IF (I .LT. NCOL) GO TO 210                                        VS  5686
      KLL=NCOL-1                                                        VS  5687
      KC=KC+1                                                           VS  5688
      IF(K.GT.1.AND.I.EQ.(NS(K-1)+1)) KC=1                              VS  5689
      NCOL=NCOL+M1(K,KC)-1                                              VS  5690
  210 KL=I-KLL                                                          VS  5691
      FM=M1(K,KC)                                                       VS  5692
      AA=CHORD*SJ(K,KL,KC)*WIDTH(K,KC)/FM                               VS  5693
      AA=AA*FATR                                                        VS  5694
      CLT=CLT+CL(I)*AA                                                  VS  5695
      CMT=CMT+CM(I)*AA                                                  VS  5696
      CDT=CDT+CD(I)*AA                                                  VS  5697
      CLPP=CLPP+CLPPS*AA                                                VS  5698
      CDPP=CDPP+CDPPS*AA                                                VS  5699
      CLGM=CLGM+CLG1*AA                                                 VS  5700
      CDGM=CDGM+CDG1*AA                                                 VS  5701
      CMGM=CMGM+CMG1*AA                                                 VS  5702
      IF(IO.GE.NVRTX(K).AND.NVRTX(K).NE.0) DMM(I)=0.                    VS  5703
      IF(IO.LE.MVRTX(K).AND.MVRTX(K).NE.0) DMM(I)=0.                    VS  5704
      IF(IO.GE.NVRTX(K).AND.NVRTX(K).NE.0) GO TO 252                    VS  5705
      IF(IO.LE.MVRTX(K).AND.MVRTX(K).NE.0) GO TO 252                    VS  5706
      YC=YLE(KCH)                                                       VS  5707
      RR=ABS(CSU(I))*CHORD                                              VS  5708
      XC=XLE(KCH)+RR                                                    VS  5709
      IF(XC.LT.XTE(KCH)) GO TO 2100                                     VS  5710
      CAMLE=0.                                                          VS  5711
      CAMY=0.                                                           VS  5712
      GO TO 2101                                                        VS  5713
 2100 XY=RR/CHORD                                                       VS  5714
      DZ=XLE(KCH)                                                       VS  5715
      CAMLE=100.                                                        VS  5716
      CAMY=RR                                                           VS  5717
      IF(ICAM(K).LE.1) CALL ZCR(XY,YC,CAMLE,ICAM,DZ,K,1,CHORD,CAMY,IST, VS  5718
     1TSW)                                                              VS  5719
      IF(ICAM(K).EQ.3) CALL ZCR(XC,YC,CAMLE,ICAM,DZ,K,1,CHORD,CAMY,IST, VS  5720
     1TSW)                                                              VS  5721
      IF(ICAM(K).EQ.2) CALL ZCDX(XC,YC,CAMLE,CAMY)                      VS  5722
 2101 CONTINUE                                                          VS  5723
      FT=SQRT((1.+CAMLE*CAMLE)*COD*COD+(SOD+CAMY*COD)**2)               VS  5724
      DXA=0.                                                            VS  5725
      EFFC=1.                                                           VS  5726
      EFFB=1.                                                           VS  5727
      EFFD=1.                                                           VS  5728
      IF(I.GE.NVL1(JA).AND.I.LE.NVL2(JA)) GO TO 261                     VS  5729
      GO TO 262                                                         VS  5730
  261 IF(I.NE.NVL1(JA)) GO TO 263                                       VS  5731
C       AUGMENTED VORTEX LIFT EFFECT                                    VS  5732
      IF(IBD.EQ.0) GO TO 263                                            VS  5733
      XRR=AUX(K,NO)-CRX(K,NO)                                           VS  5734
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      XR=AUX(K,NB)-XRR                                                  VS  5735
      DX=0.                                                             VS  5736
      IF(ABS(XR).GT.1.E-3) DX=ABS(XTILT(JA)/XR)                         VS  5737
      DA=REDBD(DX)                                                      VS  5738
      ABRN=ALPBD(K,MA)-DA*PI/180.                                       VS  5739
      ABRNB=ALBDBR(K,MA)-DA*PI/180.                                     VS  5740
      ABRNL=ALBDBL(K,MA)-DA*PI/180.                                     VS  5741
      IF(ABRNB.LT.0.) ABRNB=0.                                          VS  5742
      IF(ABRN.LT.0.) ABRN=0.                                            VS  5743
  263 CONTINUE                                                          VS  5744
      EFFC=1.                                                           VS  5745
      EFFB=1.                                                           VS  5746
      EFFD=1.                                                           VS  5747
      XMV=0.                                                            VS  5748
      XMVB=0.                                                           VS  5749
      XCT=XTILT(JA)                                                     VS  5750
      IF(IBD.EQ.0) GO TO 274                                            VS  5751
      IF(ALP.LT.ABRN) GO TO 269                                         VS  5752
      IF(ALP.GE.ALPBD(K,MA)) GO TO 264                                  VS  5753
      DAP=(ALP-ABRN)*180./PI                                            VS  5754
      DXP=BDPT(DAP)                                                     VS  5755
      FRTN=1.                                                           VS  5756
      IF(ABS(XCT).GT.1.E-3) FRTN=DXP*XR/XCT                             VS  5757
      IF(FRTN.GT.1.) FRTN=1.                                            VS  5758
      GO TO 265                                                         VS  5759
  264 FRTN=1.                                                           VS  5760
  265 CONTINUE                                                          VS  5761
      XMV= 0.5*(1.-FRTN)**2+FRTN*(1.-0.5*FRTN)*RTK                      VS  5762
      XMV=(XMV/( 1.-FRTN +FRTN*RTK)-0.5)*CTILT(JA)                      VS  5763
      EFFC=1.-FRTN+FRTN*RTK                                             VS  5764
      IF(EFFC.GT.1.) EFFC=1.                                            VS  5765
      IF(FF.LT.1.) EFFC=1.                                              VS  5766
  269 IF(LAT.NE.1) GO TO 272                                            VS  5767
      DAQ=(ALP-ABRNL)*180./PI                                           VS  5768
      DXP=0.                                                            VS  5769
      DAP=(ALP-ABRNB)*180./PI                                           VS  5770
      IF(DAP.GT.0.) DXP=BDPT(DAP)                                       VS  5771
      DXQ=0.                                                            VS  5772
      IF(DAQ.GT.0.) DXQ=BDPT(DAQ)                                       VS  5773
      FTN=1.                                                            VS  5774
      IF(ABS(XCT).GT.1.E-3) FTN=DXP*XR/XCT                              VS  5775
      IF(FTN.GT.1.) FTN=1.                                              VS  5776
      FTNL=1.                                                           VS  5777
      IF(ABS(XCT).GT.1.E-3) FTNL=DXQ*XR/XCT                             VS  5778
      IF(FTNL.GT.1.) FTNL=1.                                            VS  5779
      IF(ALP.LT.ABRNB) GO TO 272                                        VS  5780
      IF(ALP.GE.ALBDBR(K,MA)) FTN=1.                                    VS  5781
      IF(ALP.GE.ALBDBL(K,MA)) FTNL=1.                                   VS  5782
  271 XMVB=0.5*(1.-FTN)**2+FTN*(1.-0.5*FTN)*RTBR                        VS  5783
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      XMVB=(XMVB/(1.-FTN+FTN*RTBR)-0.5)*CTILT(JA)                        VS  5784
      EFB=1.-FTN+FTN*RTBR                                               VS  5785
      EFFD=1.-FTNL+FTNL*RTBL                                            VS  5786
      EFFB=0.5*(EFB+EFFD)                                               VS  5787
      IF(EFFB.GT.1.) EFFB=1.                                            VS  5788
      IF(FBR.LT.1. .OR. FBL.LT.1.) EFFB=1.                              VS  5789
  272 CONTINUE                                                          VS  5790
      IF(NVL2(JA).EQ.NS(K).AND.I.EQ.NS(K)) GO TO 273                    VS  5791
      GO TO 262                                                         VS  5792
  273 BMR(3,K)=XMV                                                      VS  5793
      GO TO 262                                                         VS  5794
  274 IF(I.NE.NS(K)) GO TO 262                                          VS  5795
      BMR(3,K)=0.                                                       VS  5796
      BMR(3,K)=0.                                                       VS  5797
      CPCWL(K)=RRT                                                      VS  5798
      BML(4,K)=RRT                                                      VS  5799
      BMR(5,K)=RRT                                                      VS  5800
      BMR(4,K)=RRT                                                      VS  5801
      XL(1,K)=1.                                                        VS  5802
  262 CONTINUE                                                          VS  5803
      CSU(I)=CSU(I)*FF                                                  VS  5804
      DMM(I)=CSU(I)*CHORD                                               VS  5805
      CDVL=CDVL+CSU(I)*(-CAMLE*XCS+XSS)/FT*COD*AA                       VS  5806
      AUGM=CSU(I)*(CAMLE*XSS+XCS)/FT*COD*AA                             VS  5807
      CSL=CSL+AUGM                                                      VS  5808
      CAX=CAX+CAXL*AA                                                   VS  5809
      CAXV=CAXV+CSU(I)*(-CAMLE)*COD/FT*AA                               VS  5810
      CAVS(I)=CSU(I)*(-CAMLE)*COD/FT*AA                                 VS  5811
      PM=XLE(KCH)+Z1*CAMLE-XREF                                         VS  5812
      CSXL=CSXL-CSU(I)*PM*AA*COD/FT                                     VS  5813
      IF(JA.EQ.1) CSNW=CSNW+(CSU(I)+CVR(I)*FF)*AA*EFFC                  VS  5814
      IF(MZ.NE.10) GO TO 902                                            VS  5815
      CU=CVR(I)*FF                                                      VS  5816
      DMM(I)=DMM(I)+CU*CHORD                                            VS  5817
      CLDV=CLDV+CU*(CAMLE*XSS+XCS)/FT*COD*AA                            VS  5818
      CMDV=CMDV-CU*PM*AA*COD/FT                                         VS  5819
      CDDV=CDDV+CU*(-CAMLE*XCS+XSS)/FT*COD*AA                           VS  5820
  902 CONTINUE                                                          VS  5821
C     WRITE(JPT,2) EFFC,FF,YY,XTE(KH),AUX(K,IPN),FATR                   VS  5822
      IF(I.GE.NVL1(JA).AND.I.LE.NVL2(JA)) GO TO 266                     VS  5823
      GO TO 252                                                         VS  5824
  266 CONTINUE                                                          VS  5825
      CSAUG=CSAUG+AUGM*EFFC*CTILT(JA)/SLETH(JA)                         VS  5826
      CMAUG=CMAUG-AUGM*EFFC*(XCNTD(JA)+XMV)*CTILT(JA)/SLETH(JA)         VS  5827
  252 CONTINUE                                                          VS  5828
      IF(LAT.EQ.0) GO TO 221                                            VS  5829
      IF(LAT.EQ.1) GO TO 1357                                           VS  5830
      CLL=CLL+CLBS*AA                                                   VS  5831
      CLLV=CLLV+CLB1*AA                                                 VS  5832
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      CNL=CNL+CNS*AA                                                    VS  5833
      CNLV=CNLV+CNB1*AA                                                 VS  5834
C     WRITE(JPT,2) CLL,CLLV,CNL,CNLV                                    VS  5835
      GO TO 221                                                         VS  5836
 1357 CONTINUE                                                          VS  5837
      CY=CY+CYS*AA                                                      VS  5838
      CNB=CNB+CNS*AA                                                    VS  5839
      CLB=CLB+CLBS*AA                                                   VS  5840
      CYP=CYP+CYPS*AA                                                   VS  5841
      CNP=CNP+CNPS*AA                                                   VS  5842
      CLP=CLP+CLPS*AA                                                   VS  5843
      CYR=CYR+CYRS*AA                                                   VS  5844
      CNR=CNR+CNRS*AA                                                   VS  5845
      CLRR=CLRR+CLRS*AA                                                 VS  5846
      CLPV=CLPV+CLPVS*AA                                                VS  5847
      CYPV=CYPV+CYP1*AA                                                 VS  5848
      CNPV=CNPV+CNP1*AA                                                 VS  5849
      CYRV=CYRV+CYR1*AA                                                 VS  5850
      CNRV=CNRV+CNR1*AA                                                 VS  5851
      CLRRV=CLRRV+CLR1*AA                                               VS  5852
      CYBV=CYBV+CYB1*AA                                                 VS  5853
      CNBV=CNBV+CNB1*AA                                                 VS  5854
      CLBV=CLBV+CLB1*AA                                                 VS  5855
      IF(I.GE.NVL1(JA).AND.I.LE.NVL2(JA)) GO TO 2091                    VS  5856
      GO TO 221                                                         VS  5857
 2091 FAUG=CTILT(JA)/SLETH(JA)                                          VS  5858
      FAUGB=FAUG*EFFB                                                   VS  5859
      IF(YYB.LT.DBB) YYB=DBB                                            VS  5860
      YAUGB=FAUGB*(YCNTD(JA)-YYB)/HALFB(1)                              VS  5861
      XAUGB=FAUGB*(XCNTD(JA)+XMVB)/HALFB(1)                             VS  5862
      FAUG=FAUG*EFFC                                                    VS  5863
      YAUG=FAUG*(YCNTD(JA)-YYP)/HALFB(1)                                VS  5864
      XAUG=FAUG*(XCNTD(JA)+XMV)/HALFB(1)                                VS  5865
      CYPVA=CYPVA-CPCVS*AA*FAUG*SOD                                     VS  5866
      CLPVA=CLPVA-CPCVS*AA*YAUG                                         VS  5867
      CNPVA=CNPVA+CPCVS*AA*XAUG*SOD                                     VS  5868
      CYBVA=CYBVA-CBCVS*AA*FAUGB*SOD                                    VS  5869
      CLBVA=CLBVA-CBCVS*AA*YAUGB                                        VS  5870
      CNBVA=CNBVA+CBCVS*AA*XAUGB*SOD                                    VS  5871
      CYRVA=CYRVA-CRCVS*AA*FAUG*SOD                                     VS  5872
      YAUG=FAUG*(YCNTD(JA)-YYR)/HALFB(1)                                VS  5873
      CLRRVA=CLRRVA-CRCVS*AA*YAUG                                       VS  5874
      CNRVA=CNRVA+CRCVS*AA*XAUG*SOD                                     VS  5875
  221 CONTINUE                                                          VS  5876
      IF(I.EQ.NVL2(JA)) JA=JA+1                                         VS  5877
      MM=MM+NW(K,1)                                                     VS  5878
      IF(I.EQ.NS(K)) CPSWL(K)=IPN                                       VS  5879
      IF(IWING(K).NE.0.AND.I.EQ.IWING(K)) GO TO 217                     VS  5880
      IF(I.EQ.NCS) GO TO 215                                            VS  5881
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      IF(I.EQ.NS(K)) GO TO 217                                          VS  5882
      IF(YLE(KCH+1).LT.YBREAK(K,IPN)) GO TO 215                         VS  5883
  217 CONTINUE                                                          VS  5884
      NI=0                                                              VS  5885
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NI=1                                VS  5886
      IF(NI.EQ.1) IPN=IPN+1                                             VS  5887
      ZB=ZB+(YBREAK(K,IPN)-YB)*DSIN(K,IPN)                              VS  5888
      YBB=YBB+(YBREAK(K,IPN)-YB)*DCOS(K,IPN)                            VS  5889
      YB=YBREAK(K,IPN)                                                  VS  5890
      IF(IWING(K).NE.0.AND.I.EQ.IWING(K)) GO TO 218                     VS  5891
      IF(I.EQ.NS(K)) GO TO 218                                          VS  5892
      GO TO 219                                                         VS  5893
  218 SOW=SOD                                                           VS  5894
      COW=COD                                                           VS  5895
      YPRW=YBB                                                          VS  5896
      YRW=YB                                                            VS  5897
      ZPRW=ZB                                                           VS  5898
      YBKW=YBREAK(K,IPN)                                                VS  5899
      IF(IWGLT(K).EQ.1) GO TO 219                                       VS  5900
      ZB=0.                                                             VS  5901
      YB=BREAK(K,1)                                                     VS  5902
      YBB=BREAK(K,1)                                                    VS  5903
      IF(I.EQ.NS(K).AND.K.LT.6) YB=BREAK(K+1,1)                         VS  5904
      IF(I.EQ.NS(K).AND.K.LT.6) YBB=BREAK(K+1,1)                        VS  5905
      IF(IWGLT(K).NE.2) GO TO 219                                       VS  5906
      ZB=YBREAK(K,NC(K)-2)*DSIN(K,1)                                    VS  5907
      YBB=YBREAK(K,NC(K)-2)*DCOS(K,1)                                   VS  5908
      YB=YBREAK(K,NC(K)-2)                                              VS  5909
      YPRW=YBB                                                          VS  5910
      YRW=YB                                                            VS  5911
      ZPRW=ZB                                                           VS  5912
  219 CONTINUE                                                          VS  5913
      IF(NI.NE.1) IPN=IPN+1                                             VS  5914
  215 CONTINUE                                                          VS  5915
      IF(I.EQ.NS(K)) IPN=1                                              VS  5916
      IF(LL.EQ.MJW2(K,2,NL)) NL=NL+1                                    VS  5917
      IF(LL.EQ.LPN(K)) NL=1                                             VS  5918
      IF(I.NE.NS(K)) GO TO 1401                                         VS  5919
      X(K,1)=ZPPW                                                       VS  5920
      X(K,2)=YPRW                                                       VS  5921
      X(K,3)=SOD                                                        VS  5922
      X(K,4)=COD                                                        VS  5923
      X(K,5)=SOW                                                        VS  5924
      X(K,6)=COW                                                        VS  5925
      X(K,7)=YRW                                                        VS  5926
      X(K,8)=YBKW                                                       VS  5927
      X(K,9)=YBB                                                        VS  5928
      X(K,10)=YB                                                        VS  5929
      X(K,11)=ZB                                                        VS  5930
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1401 CONTINUE                                                          VS  5931
     KCH=KCH+1                                                         VS  5932
     IF(IWING(K).EQ.0) GO TO 2102                                      VS  5933
     IF(I.NE.IWING(K)) GO TO 2102                                      VS  5934
     CLWL(K)=CLT                                                       VS  5935
     CMWL(K)=CMT                                                       VS  5936
     CDWL(K)=CDT                                                       VS  5937
2102 CONTINUE                                                          VS  5938
     IF(I.NE.NS(K)) GO TO 150                                          VS  5939
     CLW(K)=CLT                                                        VS  5940
     CMW(K)=CMT                                                        VS  5941
     CDW(K)=CDT                                                        VS  5942
     IF(NW(K,2).EQ.0) GO TO 153                                        VS  5943
     IF(K.EQ.1) KCH=KCH+NS(K)                                          VS  5944
     IF(K.GT.1) KCH=KCH+NS(K)-NS(K-1)                                  VS  5945
 153 CONTINUE                                                          VS  5946
     MM=0                                                              VS  5947
     JK=LPN(K)                                                         VS  5948
 150 IF(LL.EQ.LPN(K)) K=K+1                                            VS  5949
     IF(LAT.EQ.0) GO TO 1358                                           VS  5950
     WRITE(JPT,2) SOW,COW,SOD,COD,YBREAK(1,IPN),YBB,YB,ZB              VS  5951
C    WRITE(JPT,2) DYB(1),DYR(1)                                        VS  5952
C    IF(LAT.EQ.(-1)) GO TO 1358                                        VS  5953
     CYBVSE=CYBV                                                       VS  5954
     CNBVSE=CNBV                                                       VS  5955
     CLBVSE=CLBV                                                       VS  5956
     CYPVSE=CYPV                                                       VS  5957
     CNPVSE=CNPV                                                       VS  5958
     CLPVSE=CLPV                                                       VS  5959
     CYRSE=CYRV                                                        VS  5960
     CNRVSE=CNRV                                                       VS  5961
     CLRVSE=CLPRV                                                      VS  5962
1358 CONTINUE                                                          VS  5963
C                                                                      VS  5964
C      SIDE-EDGE EFFECT                                                VS  5965
C                                                                      VS  5966
                                                                       VS  5967
     CDVS=0.                                                           VS  5968
     CLVS=0.                                                           VS  5969
     CMVS=0.                                                           VS  5970
     CLNSE=CLL                                                         VS  5971
     CNNSE=CNL                                                         VS  5972
     CLNSEV=CLLV                                                       VS  5973
     CNNSEV=CNLV                                                       VS  5974
     CX=1.                                                             VS  5975
     IF(ABS(CTX).GT.0.001) CX=CTX                                      VS  5976
     DO 189 I=1,NSUR                                                   VS  5977
C    WRITE(JPT,2) CPCWL(I),DYB(I),DYR(I)                               VS  5978
     IF(NVRTX(I).NE.(NS(I)+1)) GO TO 189                               VS  5979
     CTIP=CTP(I,1)*DCOS(I,NWING(I))
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      CTIP=CTIP*CPCWL(I)                                                VS  5980
      CTIP=0.                                                           VS  5981
      IF(IWGLT(I).NE.0) CTIPP=CTP(I,2)*DCOS(I,NWING(I)+1)               VS  5982
      IF(NASYM.EQ.1) CTIP=CTIP+CTP(I,2)*DCOS(I,NC(I))                   VS  5983
      KK=NS(I)                                                          VS  5984
      IF(IWING(I).NE.0) KK=IWING(I)                                     VS  5985
      CDVS=CDVS+CTIP*SNALP(KK)+CTIPP*SNALP(NS(I))                       VS  5986
      CLVS=CLVS+CTIP*CNALP(KK)+CTIPP*CNALP(NS(I))                       VS  5987
      CMVS=CMVS+CTIP*(1.-BMR(3,I)/CX)+CTIPP                             VS  5988
  189 CONTINUE                                                          VS  5989
      IF(LAT.EQ.0) GO TO 222                                            VS  5990
      DO 1321 K=1,NSUP                                                  VS  5991
      RRT=CBMR(K)                                                       VS  5992
      MA=1                                                              VS  5993
      IF(MSTP(K).NE.0) MA=2                                             VS  5994
      NCNT=1                                                            VS  5995
      IF (IWING(K).NE.0.OR.NASYM.EQ.1) NCNT=2                           VS  5996
      DO 223 KK=1,NCNT                                                  VS  5997
      FATR=1.                                                           VS  5998
      IF (IV(K).EQ.1) FATR=0.5                                          VS  5999
      K1=KK                                                             VS  6000
      IF(NASYM.EQ.1) GO TO 229                                          VS  6001
      IF(IWING(K).EQ.0) GO TO 229                                       VS  6002
      IF(KK.EQ.2) GO TO 229                                             VS  6003
      SS=X(K,5)                                                         VS  6004
      CS=X(K,6)                                                         VS  6005
      YB2=X(K,2)                                                        VS  6006
      YB1=X(K,7)                                                        VS  6007
      ZB1=X(K,1)                                                        VS  6008
      YKP=X(K,8)                                                        VS  6009
      IF(KK.EQ.1) GO TO 224                                             VS  6010
  229 CONTINUE                                                          VS  6011
      IF(KK.EQ.2) K1=KK+1                                               VS  6012
      IF(KK.EQ.1) GO TO 1366                                            VS  6013
      IF(NASYM.EQ.0) GO TO 1366                                         VS  6014
      SS=DSIN(K,1)                                                      VS  6015
      CS=DCOS(K,1)                                                      VS  6016
      YB2=YBBK                                                          VS  6017
      YB1=YBREAK(K,1)                                                   VS  6018
      ZB1=ZBK                                                           VS  6019
      YKP=BREAK(K,1)                                                    VS  6020
      GO TO 224                                                         VS  6021
 1366 CONTINUE                                                          VS  6022
      SS=X(K,3)                                                         VS  6023
      CS=X(K,4)                                                         VS  6024
      YB2=X(K,9)                                                        VS  6025
      YB1=X(K,10)                                                       VS  6026
      ZB1=X(K,11)                                                       VS  6027
      IPN=CPSWL(K)                                                      VS  6028
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      YKP=YBREAK(K,IPN)                                                  VS  6029
  224 ISN=1                                                              VS  6030
      FN=NW(K,1)                                                         VS  6031
      NCW=NW(K,1)+NW(K,2)                                                VS  6032
      DO 225 J=1,NCW                                                     VS  6033
      JJ=J                                                               VS  6034
      IF(J.LE.NW(K,1)) GO TO 226                                         VS  6035
      ISN=2                                                              VS  6036
      FN=NW(K,2)                                                         VS  6037
      JJ=J-NW(K,1)                                                       VS  6038
      K1=KK+1                                                            VS  6039
      IF(KK.EQ.2) K1=KK+2                                                VS  6040
  226 FJJ=JJ                                                             VS  6041
C     WRITE(JPT,2) SS,CS,YB2,YB1,ZB1,YKP                                 VS  6042
      XYZ=Y(4+K,J)                                                       VS  6043
      IF(KK.EQ.2) XYZ=Y(10+K,J)                                          VS  6044
      ZCV=CS*(ZB1+(YKP-YB1)*SS)-SS*(YB2+(YKP-YB1)*CS)                    VS  6045
      YCV=SS*(ZB1+(YKP-YB1)*SS)+CS*(YB2+(YKP-YB1)*CS)                    VS  6046
      XO=YCN(K,K1)+0.5*CHORDT(K,K1)*(1.-COS((2.*FJJ-1.)*PI/(2.*FN)))     VS  6047
      XO=XO-XREF                                                         VS  6048
      IF(LAT.EQ.1) GO TO 1359                                            VS  6049
      FKN=0.                                                             VS  6050
      IF(NASYM.EQ.0) FKN=SE(2,K,J)                                       VS  6051
      IF(NASYM.EQ.0.AND.KK.EQ.2) FKN=DUMT(2,K,J)                         VS  6052
      S1=1.                                                              VS  6053
      S3=1.                                                              VS  6054
      IF(NASYM.EQ.0) GO TO 1367                                          VS  6055
      IF(XYZ.LT.0..AND.KK.EQ.1) S1=-1.                                   VS  6056
      IF(XYZ.GT.0..AND.KK.EQ.2) S1=-1.                                   VS  6057
      IF(XYZ.LT.0.) S3=-1.                                               VS  6058
      GO TO 1368                                                         VS  6059
 1367 CONTINUE                                                           VS  6060
      S2=1.                                                              VS  6061
      IF((XYZ+FKN).LT.0.) S2=-1.                                         VS  6062
      SUM=FKN*FKN                                                        VS  6063
      SM1=XYZ+FKN                                                        VS  6064
      SM2=XYZ-FKN                                                        VS  6065
      IF(SM1.GE.0..AND.SM2.GE.0.) SUM=0.                                 VS  6066
      IF(SM1.LT.0..AND.SM2.LT.0.) SUM=0.                                 VS  6067
 1368 CONTINUE                                                           VS  6068
      IF(NASYM.EQ.0) CK=CHORDT(K,K1)*(2.*XYZ*FKN+SUM)*S2*SN(K,JJ,ISN)/FNVS  6069
      IF(NASYM.EQ.1) CK=CHORDT(K,K1)*XYZ*XYZ*S1*SN(K,JJ,ISN)/FN          VS  6070
      CK=CK*FATR*CS                                                      VS  6071
      CLL=CLL+CK/CS*ZCV*PIS                                              VS  6072
      CNL=CNL-CK*XO*PIS                                                  VS  6073
      CLLV=CLLV-CK/CS*YCV*PIS*S1*S3                                      VS  6074
      CNLV=CNLV+CK/CS*SS*PIS*XO*S1*S3                                    VS  6075
      GO TO 225                                                          VS  6076
 1359 CONTINUE                                                           VS  6077
```

```
      S1=1.                                                              VS  6078
      IF(NASYM.EQ.1 .AND. KK.EQ.2) S1=-1.                                VS  6079
      SE1=SE(1,K,J)                                                      VS  6080
      SE2=SE(2,K,J)                                                      VS  6081
      SE3=SE(3,K,J)                                                      VS  6082
      IF(KK.EQ.1) GO TO 1389                                             VS  6083
      SE1=DUMT(1,K,J)                                                    VS  6084
      SE2=DUMT(2,K,J)                                                    VS  6085
      SE3=DUMT(3,K,J)                                                    VS  6086
 1389 CONTINUE                                                           VS  6087
      SUM1=SE1*SE1                                                       VS  6088
      SUM2=SE2*SE2                                                       VS  6089
      SUM3=SE3*SE3                                                       VS  6090
      SM11=XYZ+SE1                                                       VS  6091
      SM12=XYZ-SE1                                                       VS  6092
      SM21=XYZ+SE2                                                       VS  6093
      SM22=XYZ-SE2                                                       VS  6094
      SM31=XYZ+SE3                                                       VS  6095
      SM32=XYZ-SE3                                                       VS  6096
      IF(SM11.GE.0. .AND. SM12.GE.0.) SUM1=0.                            VS  6097
      IF(SM11.LT.0. .AND.SM12.LT.0.) SUM1=0.                             VS  6098
      IF(SM21.GE.0. .AND. SM22.GE.0.) SUM2=0.                            VS  6099
      IF(SM21.LT.0. .AND. SM22.LT.0.) SUM2=0.                            VS  6100
      IF(SM31.GE.0. .AND. SM32.GE.0.) SUM3=0.                            VS  6101
      IF(SM31.LT.0. .AND. SM32.LT.0.) SUM3=0.                            VS  6102
      S21=1.                                                             VS  6103
      S22=1.                                                             VS  6104
      S23=1.                                                             VS  6105
      IF(SM11.LT.0.) S21=-1.                                             VS  6106
      IF(SM21.LT.0.) S22=-1.                                             VS  6107
      IF(SM31.LT.0.) S23=-1.                                             VS  6108
      CK=CHORDT(K,K1)*(2.*XYZ*SE1+SUM1)*SN(K,JJ,ISN)/FN                  VS  6109
      CK2=CHORDT(K,K1)*(2.*XYZ*SE2+SUM2)*SN(K,JJ,ISN)/FN                 VS  6110
      YRF=HALFR(K)                                                       VS  6111
      IF (NASYM.EQ.1 .AND. KK.EQ.2) YRF=BREAK(K,1)                       VS  6112
      IF (NASYM.EQ.0 .AND. KK.EQ.2) YRF=YBREAK(K,NC(K))                  VS  6113
      SUM3=SUM3-2.*RL*YRF/HALFB(1)*XYZ*XYZ*BMR(5,K)                      VS  6114
      CK3=CHORDT(K,K1)*(2.*XYZ*SE3+SUM3)*SN(K,JJ,ISN)/FN                 VS  6115
      CK=CK*RRT                                                          VS  6116
      CK2=CK2*RRT                                                        VS  6117
      CK3=CK3*RRT                                                        VS  6118
      CK=CK*FATR*CS*S1*S21                                               VS  6119
      CK2=CK2*FATR*CS*S1*S22                                             VS  6120
      CK3=CK3*FATR*CS*S1*S23                                             VS  6121
      CY=CY+CK2*PIS                                                      VS  6122
      CNB=CNB-CK2*XQ*PIS                                                 VS  6123
      CLB=CLB+CK2/CS*ZCV*PIS                                             VS  6124
      CYP=CYP+CK*PIS                                                     VS  6125
      CNP=CNP-CK*XQ*PIS                                                  VS  6126
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      CLP=CLP+CK/CS*ZCV*PIS                                                    VS  6127
      CYR=CYR+CK3*PIS                                                          VS  6128
      CNR=CNR-CK3*XO*PIS                                                       VS  6129
      CLRR=CLRR+CK3/CS*ZCV*PIS                                                 VS  6130
C     WRITE(JPT,2) XYZ,SE1,SUM1,SUM2,SUM3,ZCV,YCV                              VS  6131
      CYBVSE=CYBVSE+CK2*PIS                                                    VS  6132
      CNBVSE=CNBVSE-CK2*XO*PIS                                                 VS  6133
      CLBVSE=CLBVSE+CK2/CS*ZCV*PIS                                             VS  6134
      CYPVSE=CYPVSE+CK*PIS                                                     VS  6135
      CNPVSE=CNPVSE-CK*PIS*XO                                                  VS  6136
      CLPVSE=CLPVSE+CK/CS*ZCV*PIS                                              VS  6137
      CYRSE=CYRSE+CK3*PIS                                                      VS  6138
      CNRVSE=CNRVSE-CK3*PIS*XO                                                 VS  6139
      CLRVSE=CLRVSE+CK3/CS*ZCV*PIS                                             VS  6140
C       EFFECT OF VORTEX BREAKDOWN                                             VS  6141
      BR=-XO/HALFB(1)*RL                                                       VS  6142
      BLR=BR                                                                   VS  6143
      IF(IBD.EQ.0) GO TO 1369                                                  VS  6144
      IF(PBK.GT.0.01) BLR=-BK-BR                                               VS  6145
      BLR=ABS(BLR)                                                             VS  6146
      AB1=ABD(K,MA)                                                            VS  6147
      AB2=ABDR(K,MA)                                                           VS  6148
      AB3=ABDL(K,MA)                                                           VS  6149
      AB4=ALBDBL(K,1)                                                          VS  6150
      ARL=AB1-(AB1-AB2)/BK*BLR                                                 VS  6151
      NB=NWING(K)                                                              VS  6152
      BLR=(AUX(K,NB)-XREF)/HALFB(1)*RL                                         VS  6153
      BLR=ABS(BLR)                                                             VS  6154
      CRL=AB1-(AB1-AB2)/BK*BLR                                                 VS  6155
      RTBR=BML(3,K)                                                            VS  6156
      RTBL=BML(2,K)                                                            VS  6157
      FA=1.                                                                    VS  6158
      IF(ALP.GE.CRL.AND.ALP.LT.AB1) FA=1.-(1.-RTBL)*(ALP-CRL)/(AB1-CRL)        VS  6159
      IF(ALP.GE.AB1) FA=RTBL                                                   VS  6160
      XL(2,K)=1.                                                               VS  6161
      IF(ALP.GT.ARL.AND.ALP.LT.CRL) XL(2,K)=0.5*(RTBR+1.)                      VS  6162
      IF(ALP.GE.CRL) XL(2,K)=0.5*(RTBR+FA)                                     VS  6163
      RTK=BMR(2,K)                                                             VS  6164
      FB=1.                                                                    VS  6165
      IF(ALP.GE.CRL.AND.ALP.LT.AB1) FB=1.-(1.-RTK)*(ALP-CRL)/(AB1-CRL)         VS  6166
      IF(ALP.GE.AB1) FB=RTK                                                    VS  6167
      ABC=CBMR(K)                                                              VS  6168
      IF(ALP.GT.ARL.AND.ALP.LT.CRL) ABC=0.5*(RTK+1.)*CBMR(K)                   VS  6169
      IF(ALP.GE.CRL)ABC=0.5*(RTK+FB)*CBMR(K)                                   VS  6170
      GO TO 1388                                                               VS  6171
 1369 XL(2,K)=1.                                                               VS  6172
      ABC=CBMR(K)                                                              VS  6173
 1388 CONTINUE                                                                 VS  6174
C     WRITE(JPT,2) CK,CK2,CK3,XYZ,SE2,SE3,BMR(5,K)                             VS  6175
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      IF(NVRTX(K).NE.(NS(K)+1)) GO TO 223                                VS  6176
      B1=CHORDT(K,K1)*2.*XYZ*XYZ*BMP(4,K)*GB*SN(K,JJ,ISN)/FN*FATR*CS*S1  VS  6177
      CK2=CK2+B1                                                         VS  6178
      PB1=CHORDT(K,K1)*2.*XY7*GB*SE1*SN(K,JJ,ISN)/FN*FATR*CS*S1          VS  6179
      IF(PBK.GT.0.01) CK2=CK2+PB1                                        VS  6180
      R1=CHORDT(K,K1)*2.*XYZ*XYZ*ABC*BR*SN(K,JJ,ISN)/FN*FATR*CS*S1       VS  6181
      CK3=CK3+R1                                                         VS  6182
      RB1=CHORDT(K,K1)*2.*XY7*GR*SE3*SN(K,JJ,ISN)/FN*FATR*CS*S1          VS  6183
      IF(PBK.GT.0.01) CK3=CK3+RB1                                        VS  6184
      DR=BML(5,K)                                                        VS  6185
C     WRITE(JPT,2) ARL,CRL,RTBR,RTBL,DR,BMR(4,K)                         VS  6186
C     WRITE(JPT,2) CK2,CK3,BML(4,K),XL(1,K),XL(2,K)                      VS  6187
      CK=CK*BML(4,K)                                                     VS  6188
      CK2=CK2*XL(1,K)                                                    VS  6189
      CK3=CK3*XL(2,K)                                                    VS  6190
C     ADDITIONAL VORTEX LIFT ON THE LEFT OUTBOARD PANEL                  VS  6191
      FBB=1.                                                             VS  6192
      ID=0                                                               VS  6193
      IF(MA.EQ.2.AND.IAGVX.EQ.1) ID=1                                    VS  6194
      IF(ID.EQ.1.AND.ALP.GT.AB3) FBB=CA(K)                               VS  6195
      IF(ALP.GE.ALPBD(K,1).AND.IAGVX.EQ.0) FBB=0.                        VS  6196
      GG=CPCWL(K)                                                        VS  6197
      IF(ID.EQ.0) GO TO 891                                              VS  6198
      IF(ALP.GT.AB2) GG=RTK                                              VS  6199
      IF(ALP.GT.AB3) FBB=0.                                              VS  6200
  891 CONTINUE                                                           VS  6201
      FBB=FBB*CA(K)                                                      VS  6202
      FBC=FBB                                                            VS  6203
      IF(MA.EQ.2.AND.IAGVX.EQ.0) FBC=0.                                  VS  6204
      TB1=0.5*(FBC-CA(K)*FBB)*B1                                         VS  6205
      TB2=CHORDT(K,K1)*XYZ*XY7*SN(K,JJ,ISN)/FN*FATR*CS                   VS  6206
      TB3=0.5*(1.-GG)*TB2*FBB*S1                                         VS  6207
      CK2=CK2+TB1-TB3                                                    VS  6208
C     WRITE(JPT,2) CK2,TB1,TB3,TB2                                       VS  6209
  916 CONTINUE                                                           VS  6210
      CYBV=CYBV-CK2/CS*SS*PIS                                            VS  6211
      CNBV=CNBV+CK2/CS*SS*PIS*XO                                         VS  6212
      CLBV=CLBV-CK2/CS*(YCV-DYB(K))*PIS                                  VS  6213
      CYPV=CYPV-CK/CS*SS*PIS                                             VS  6214
      CNPV=CNPV+CK/CS*SS*PIS*XO                                          VS  6215
      CYRV=CYPV-CK3/CS*SS*PIS                                            VS  6216
      CNRV=CNRV+CK3/CS*SS*PIS*XO                                         VS  6217
      CLRRV=CLRRV-CK3/CS*(YCV-DYR(K))*PIS                                VS  6218
      CLPV=CLPV-CK/CS*(YCV-DP)*PIS                                       VS  6219
  225 CONTINUE                                                           VS  6220
  223 CONTINUE                                                           VS  6221
 1321 CONTINUE                                                           VS  6222
  222 CONTINUE                                                           VS  6223
      IF(ABS(CSL).GT.0.0001) XLEBAR=CSXL/CSL                             VS  6224
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      IF(ABS(CSAUG).GT.0.0001) XAUGB=CMAUG/CSAUG                        VS  6225
      CSNW=CSNW*0.5*PI                                                  VS  6226
      FTN=1.                                                            VS  6227
      IF(GW.GT.1.E-5) FTN=CSNW/GW                                       VS  6228
C     WRITE(JPT,2) CSNW,FTN,GW                                          VS  6229
      PISW=0.5*PI/HALFSW                                                VS  6230
      CLT=CLT*PISW                                                      VS  6231
      CMT=CMT*PISW                                                      VS  6232
      CDT=CDT*PISW                                                      VS  6233
      CLGM=CLGM*PISW*FTN                                                VS  6234
      CDGM=CDGM*PISW*FTN                                                VS  6235
      CMGM=CMGM*PISW*FTN                                                VS  6236
      CLDV=CLDV*PISW*FTN*FTN                                            VS  6237
      CDDV=CDDV*PISW*FTN*FTN                                            VS  6238
      CMDV=CMDV*PISW/CREF*FTN*FTN                                       VS  6239
      DO 1399 I=1,NSUR                                                  VS  6240
      CLW(I)=CLW(I)*PISW                                                VS  6241
      CMW(I)=CMW(I)*PISW                                                VS  6242
      CDW(I)=CDW(I)*PISW                                                VS  6243
      CLWL(I)=CLWL(I)*PISW                                              VS  6244
      CMWL(I)=CMWL(I)*PISW                                              VS  6245
      CDWL(I)=CDWL(I)*PISW                                              VS  6246
 1399 CONTINUE                                                          VS  6247
      CLPP=CLPP*PI/(2.*HALFSW)                                          VS  6248
      CDPP=CDPP*PI/(2.*HALFSW)                                          VS  6249
      CDVL=CDVL*PI/(2.*HALFSW)                                          VS  6250
      CSL=CSL*PI/(2.*HALFSW)                                            VS  6251
      CSXL=CSXL*PI/(2.*HALFSW*CREF)                                     VS  6252
      CSAUG=CSAUG*PI/(2.*HALFSW)                                        VS  6253
      CAX=CAX*PI/(2.*HALFSW)                                            VS  6254
      CAXV=CAXV*PI/(2.*HALFSW)                                          VS  6255
      CLAUG=CSAUG                                                       VS  6256
      CDAUG=CLAUG*SINA/COSA                                             VS  6257
      CMAUG=CMAUG*PI/(2.*HALFSW*CREF)                                   VS  6258
      IF(ABS(CLT).GT.0.0001) XBP=CMT/CLT*CREF                           VS  6259
      IF(IALP .EQ. 1) GO TO 166                                         VS  6260
      CDVS=CDVS*2.                                                      VS  6261
      CLVS=CLVS*2.                                                      VS  6262
      CMVS=CMVS*CTX*2./CREF                                             VS  6263
  166 CONTINUE                                                          VS  6264
      CDCL2=0.                                                          VS  6265
      IF(LAT.EQ.0) GO TO 227                                            VS  6266
      CONST=PI/(2.*HALFSW)                                              VS  6267
      CONTB=CONST/(2.*HALFB(1))                                         VS  6268
      IF(LAT.EQ.1) GO TO 1360                                           VS  6269
      C1=CLL*CONTB                                                      VS  6270
      C2=CLLV*CONTB                                                     VS  6271
      C3=CNL*CONTB                                                      VS  6272
      C4=CNLV*CONTB                                                     VS  6273
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      CLL=C1*COSA+C3*SINA                                               VS  6274
      CLLV=C2*COSA+C4*SINA                                              VS  6275
      CNL=C3*COSA-C1*SINA                                               VS  6276
      CNLV=C4*COSA-C2*SINA                                              VS  6277
      C5=CLNSE*CONTB                                                    VS  6278
      C6=CNNSE*CONTB                                                    VS  6279
      C7=CLNSEV*CONTB                                                   VS  6280
      C8=CNNSEV*CONTB                                                   VS  6281
      CLNSE=C5*COSA+C6*SINA                                             VS  6282
      CNNSE=C6*COSA-C5*SINA                                             VS  6283
      CLNSEV=C7*COSA+C8*SINA                                            VS  6284
      CNNSEV=C8*COSA-C7*SINA                                            VS  6285
      GO TO 227                                                         VS  6286
 1360 CONTINUE                                                          VS  6287
      FTN2=FTN*FTN                                                      VS  6288
      RTP=CONST/P*0.5*FTN2                                              VS  6289
      RTB=CONST/BK*0.5*FTN2                                             VS  6290
      RTR=CONST/RL*0.5*FTN2                                             VS  6291
      CY=CY*CONST/BK                                                    VS  6292
      CNB=CNB*CONTB/BK                                                  VS  6293
      CLB=CLB*CONTB/BK                                                  VS  6294
      CYP=CYP*CONST/P                                                   VS  6295
      CNP=CNP*CONTB/P                                                   VS  6296
      CLP=CLP*CONTB/P                                                   VS  6297
      CYR=CYR*CONST/RL                                                  VS  6298
      CNR=CNR*CONTB/RL                                                  VS  6299
      CLRR=CLRR*CONTB/RL                                                VS  6300
      CLPV=CLPV*CONTB/P+CLPVA*RTP                                       VS  6301
      CYBV=CYBV*CONST/BK+CYBVA*RTB                                      VS  6302
      CYBVSE=CYBVSE*CONST/BK+CYBVA*RTB                                  VS  6303
      CNBV=CNBV*CONTB/BK+CNBVA*RTB                                      VS  6304
      CNBVSE=CNBVSE*CONTB/BK+CNBVA*RTB                                  VS  6305
      CLBV=CLBV*CONTB/BK+CLBVA*RTB                                      VS  6306
      CLBVSE=CLBVSE*CONTB/BK+CLBVA*RTB                                  VS  6307
      CYPV=CYPV*CONST/P+CYPVA*RTP                                       VS  6308
      CYPVSE=CYPVSE*CONST/P+CYPVA*RTP                                   VS  6309
      CNPV=CNPV*CONTB/P+CNPVA*RTP                                       VS  6310
      CNPVSE=CNPVSE*CONTB/P+CNPVA*RTP                                   VS  6311
      CLPVSE=CLPVSE*CONTB/P+CLPVA*RTP                                   VS  6312
      CYRV=CYRV*CONST/RL+CYRVA*RTR                                      VS  6313
      CYRSE=CYRSE*CONST/RL+CYRVA*RTP                                    VS  6314
      CLRRV=CLRRV*CONTB/RL+CLRRVA*RTR                                   VS  6315
      CLRVSE=CLRVSE*CONTB/RL+CLRRVA*RTR                                 VS  6316
      CNRV=CNRV*CONTB/RL+CNRVA*RTR                                      VS  6317
      CNRVSE=CNRVSE*CONTB/RL+CNRVA*RTR                                  VS  6318
  227 CONTINUE                                                          VS  6319
      AI=1.                                                             VS  6320
C     WRITE(JPT,3) KALP,KI,NALP                                         VS  6321
      IF(KALP.LT.2) GO TO 90                                            VS  6322
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      CLF=BREAK(6,10)                                                    VS  6323
      IF(KALP.EQ.2) CLTOT=CLT+CLF                                        VS  6324
      IF(KALP.EQ.3) CLTOT=CLPP+CSL+CLVS+CLAUG+CLGM+CLDV+CLF              VS  6325
      IF(KI.GT.1) GO TO 91                                               VS  6326
      AR=2.*HALFB(1)*HALFB(1)/HALFSW                                     VS  6327
      BB2=1.-AM*AM                                                       VS  6328
      SAT=SORT(AR*AR*BB2*(1.+TANC2/BB2)+4.)                              VS  6329
      ASP=2.*PI*AR/(2.+SAT)                                              VS  6330
      GO TO 92                                                           VS  6331
   91 AI=CLTOT-CLII                                                      VS  6332
      IF(ABS(AI).LT.0.001) GO TO 90                                      VS  6333
      ASP=AI/(ALP-ALPII)                                                 VS  6334
   92 ALPINC=(CLDS-CLTOT)/ASP                                            VS  6335
      IF(KI.EQ.NALP) GO TO 90                                            VS  6336
      GO TO 341                                                          VS  6337
   90 CONTINUE                                                           VS  6338
      IF (ABS(CLT) .LE. 0.001) GO TO 44                                  VS  6339
      CDCL2=CDT/(CLT*CLT)                                                VS  6340
   44 CONTINUE                                                           VS  6341
C     WRITE(JPT,3) NC1,NC2,NASYM                                         VS  6342
      SWS=HALFSW                                                         VS  6343
      IF(NASYM.EQ.1) HALFSW=0.5*HALFSW                                   VS  6344
      IF(LAT.EQ.(-1)) GO TO 71                                           VS  6345
      CALL BENDIN(NC,CLY,BMR,IWING,BREAK,CBMR,CBTR,NWING,HALFSH,HALFBH,DVS  6346
     1COS,DSIN,IWGLT,FTL,NASYM,NC2,0,NSUP,NS)                            VS  6347
      DO 1402 I=1,NSUR                                                   VS  6348
      IF(IWGLT(I).EQ.2) CBMR(I)=CBMR(I)+FTL(I)*(X(I,3)*X(I,1)+X(I,4)*X(IVS  6349
     1,2))/HALFB(I)+CBTR(I)                                              VS  6350
C     WRITE(JPT,2) FTL(I),X(I,3),X(I,1),X(I,4),X(I,2)                    VS  6351
      CBML(I)=CBMR(I)                                                    VS  6352
      CBTL(I)=CBTR(I)                                                    VS  6353
      IF(NASYM.EQ.1) CBMR(I)=CBTR(I)                                     VS  6354
      KA=NS(I)                                                           VS  6355
      IF(I.GT.1) KA=KA-NS(I-1)                                           VS  6356
      DO 72 K=1,KA                                                       VS  6357
   72 BML(I,K)=BMR(I,K)                                                  VS  6358
 1402 CONTINUE                                                           VS  6359
      GO TO 73                                                           VS  6360
   71 IF(LAT.EQ.1) GO TO 73                                              VS  6361
      DO 74 I=1,NCS                                                      VS  6362
   74 YCON(I)=CLY(I)+CLS(I)                                              VS  6363
      CALL BENDIN(NC,YCON,BMR,IWING,BREAK,CBMR,CBTR,NWING,HALFSH,HALFBH,VS  6364
     1DCOS,DSIN,IWGLT,FTL,NASYM,NC2,1,NSUR,NS)                           VS  6365
      DO 1403 I=1,NSUR                                                   VS  6366
      IF(IWGLT(I).EQ.2) CBMR(I)=CBMR(I)+FTL(I)*(X(I,3)*X(I,1)+X(I,4)*X(IVS  6367
     1,2))/HALFB(I)+CBTR(I)                                              VS  6368
 1403 CONTINUE                                                           VS  6369
      DO 75 I=1,NCS                                                      VS  6370
   75 YCON(I)=CLY(I)-CLS(I)                                              VS  6371
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      CALL BENDIN(NC,YCON,BML,IWING,BREAK,CBML,CBTL,NWING,HALFSH,HALFBH,VS   6372
     1DCOS,DSIN,IWGLT,FTL,NASYM,NC1,2,NSUR,NS)                          VS   6373
      DO 1404 I=1,NSUR                                                  VS   6374
      IF(IWGLT(I).EQ.2) CBML(I)=CBML(I)+FTL(I)*(X(I,3)*X(I,1)+X(I,4)*X(IVS   6375
     1,2))/HALFB(I)+CBTL(I)                                             VS   6376
 1404 CONTINUE                                                          VS   6377
   73 CONTINUE                                                          VS   6378
      HALFSW=SWS                                                        VS   6379
      ALP=ALP*180./PI                                                   VS   6380
      WRITE (JPT,51)                                                    VS   6381
      IF (IALP .EQ. 1) WRITE (JPT,59)                                   VS   6382
      IF(IALP .EQ. 1) GO TO 76                                          VS   6383
      WRITE (JPT,52) ALP                                                VS   6384
      AF=0.                                                             VS   6385
      DO 2315 I=1,NSUR                                                  VS   6386
      IF(NAL(I).NE.0.AND.ABS(AF).LT.0.01) AF=DF(I,NAL(I))*180./PI       VS   6387
 2315 CONTINUE                                                          VS   6388
      IF(LAT .EQ. (-1)) WRITE(JPT,77) AF                                VS   6389
                                                                        VS   6390
   76 CONTINUE                                                          VS   6391
   77 FORMAT(/20X,19HAND AILERON ANGLE =,F8.3,2X,4HDEG.)                VS   6392
      WRITE (JPT,51)                                                    VS   6393
   51 FORMAT(/20X,42HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX)  VS   6394
   52 FORMAT(/20X,32HPRESSURE DISTRIBUTION AT ALPHA =,F8.3,2X,4HDEG.)   VS   6395
   59 FORMAT (/20X,43HPRESSURE DISTRIBUTION AT ALPHA = 1.0 RADIAN)      VS   6396
      IF(LAT.NE.(-1)) WRITE(JPT,53)                                     VS   6397
      IF(LAT.EQ.(-1)) WRITE(JPT,55)                                     VS   6398
   53 FORMAT (/3X,6HVORTEX,14X,2HXV,17X,2HYV,19X,2HCP)                  VS   6399
   55 FORMAT(/3X,6HVORTEX,14X,2HXV,17X,2HYV,17X,8HCP(LEFT),12X, 9HCP(RIGVS   6400
     1HT))                                                              VS   6401
      K1=0                                                              VS   6402
      JJ1=0                                                             VS   6403
      JK=0                                                              VS   6404
      K=1                                                               VS   6405
      KCH=1                                                             VS   6406
      DO 60 I=1,NCS                                                     VS   6407
      HAB=HALFB(K)                                                      VS   6408
      IF (NW(K,2).EQ.0) GO TO 62                                        VS   6409
      IF(K.EQ.1) I1=KCH+NS(K)                                           VS   6410
      IF(K.GT.1) I1=KCH+NS(K)-NS(K-1)                                   VS   6411
      CHORD=CH(KCH)+CH(I1)                                              VS   6412
      GO TO 63                                                          VS   6413
   62 CHORD=CH(KCH)                                                     VS   6414
   63 CONTINUE                                                          VS   6415
      NCW=NW(K,1)+NW(K,2)                                               VS   6416
      DO 61 J=1,NCW                                                     VS   6417
      JJ=JJ1+J                                                          VS   6418
      KK=K1+J                                                           VS   6419
      IF (NW(K,2).EQ.0) GO TO 64                                        VS   6420
      IF (J.LE.NW(K,1)) GO TO 64
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      IK=0                                                                  VS  6421
      IF(K.GT.1) IK=NS(K-1)                                                 VS  6422
      LL=LPAN1(K)+NW(K,2)*(I-IK-1)+JJ-NW(K,1)*(I-IK)                        VS  6423
      GO TO 65                                                              VS  6424
   64 LL=JJ+JK                                                              VS  6425
   65 CONTINUE                                                              VS  6426
      XI=(XV(LL)-XLE(KCH))/CHORD                                            VS  6427
      ETA=YV(LL)/HALFB(K)                                                   VS  6428
      IF(LAT.NE.(-1)) GO TO 66                                              VS  6429
      CPR=(CP(LL)+GAMMA(LL))*2.                                             VS  6430
      CPL=(CP(LL)-GAMMA(LL))*2.                                             VS  6431
      WRITE (JPT,54) KK,XI,ETA,CPL,CPR                                      VS  6432
      GO TO 61                                                              VS  6433
   66 CPK=2.*CP(LL)                                                         VS  6434
      WRITE(JPT,54) KK,XI,ETA,CPK                                           VS  6435
   61 CONTINUE                                                              VS  6436
      JJ1=JJ1+NW(K,1)                                                       VS  6437
      K1=K1+NCW                                                             VS  6438
      KCH=KCH+1                                                             VS  6439
      IF(I.NE.NS(K)) GO TO 60                                               VS  6440
      IF(NW(K,2).EQ.0) GO TO 67                                             VS  6441
      IF(K.EQ.1) KCH=KCH+NS(K)                                              VS  6442
      IF(K.GT.1) KCH=KCH+NS(K)-NS(K-1)                                      VS  6443
   67 CONTINUE                                                              VS  6444
      JJ1=0                                                                 VS  6445
      JK=LPN(K)                                                             VS  6446
   60 IF(I.EQ.NS(K)) K=K+1                                                  VS  6447
   54 FORMAT (6X,I3,4(10X,F10.5))                                           VS  6448
      WRITE (JPT,30)                                                        VS  6449
   30 FORMAT(/9X,3HY/S,11X,9HCL(RIGHT),6X,8HCL(LEFT),10X,2HCM,12X,2HCT,     VS  6450
     1 13X,3HCDI,12X,4HCS*C,10X,3HCAV)                                      VS  6451
  325 FORMAT(/4X,42HTHE FOLLOWING ARE THE TAIL CHARACTERISTICS)             VS  6452
  327 FORMAT(/4X,45HTHE FOLLOWING ARE THE WINGLET CHARACTERISTICS)          VS  6453
      K=1                                                                   VS  6454
      NSP=0                                                                 VS  6455
      KCH=1                                                                 VS  6456
      DO 31 I=1,NCS                                                         VS  6457
      JWING=IWING(K)                                                        VS  6458
      IF (IWGLT(K).EQ.0) GO TO 326                                          VS  6459
      IF (I .EQ. (JWING+1)) WRITE (JPT,327)                                 VS  6460
      GO TO 328                                                             VS  6461
  326 CONTINUE                                                              VS  6462
      IF(I.EQ.(NSP+1).AND.K.EQ.2) WRITE(JPT,325)                            VS  6463
      KB=K-1                                                                VS  6464
      IF(I.EQ.(NSP+1).AND.K.GT.1) WRITE(JPT,1397) KB                        VS  6465
      IF(I.EQ.(NSP+1).AND.K.GT.1) WRITE(JPT,1213)                           VS  6466
  328 CONTINUE                                                              VS  6467
      YF=YLE(KCH)/HALFB(K)                                                  VS  6468
      KCH=KCH+1                                                             VS  6469
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                                                                      VS  6470
      IF (I .NE. NS(K)) GO TO 361                                     VS  6471
      IF (NW(K,2) .EQ. 0) GO TO 361                                   VS  6472
      IF (K .EQ. 1) KCH=KCH+NS(K)                                     VS  6473
      IF (K .GT. 1) KCH=KCH+NS(K)-NS(K-1)                             VS  6474
  361 CONTINUE                                                        VS  6475
      TEM=CLS(I)                                                      VS  6476
      IF(I.EQ.NS(K)) NSP=NS(K)                                        VS  6477
      IF (I.EQ.NS(K)) K=K+1                                           VS  6478
      IF(LAT.NE.(-1)) TEM=0.                                          VS  6479
      CLRT=CL(I)+TEM                                                  VS  6480
      CLLT=CL(I)-TEM                                                  VS  6481
   31 WRITE (JPT,32) YE,CLRT,CLLT,CM(I),CT(I),CD(I),DMM(I),CAVS(I)    VS  6482
   32 FORMAT (8(5X,F10.5))                                            VS  6483
      WRITE(JPT,1303)                                                 VS  6484
 1303 FORMAT(/2X,57H*** THE FOLLOWING ARE ATTACHED POTENTIAL FLOW RESULTVS  6485
     1S ***)                                                          VS  6486
      WRITE (JPT,33) CLT                                              VS  6487
   33 FORMAT (/2X,24HTOTAL LIFT COEFFICIENT =F10.5)                   VS  6488
      WRITE (JPT,24) CDT                                              VS  6489
   24 FORMAT (/2X,32HTOTAL INDUCED DRAG COEFFICIENT =,F10.5)          VS  6490
      WRITE (JPT,35) CDCL2                                            VS  6491
   35 FORMAT (/2X,28HTHE INDUCED DRAG PARAMETER =,F10.5)              VS  6492
      WRITE (JPT,42) CMT                                              VS  6493
   42 FORMAT(/2X,35HTOTAL PITCHING MOMENT COEFFICIENT =,F10.5)        VS  6494
      IF(NSUR.GT.1) GO TO 330                                         VS  6495
      IF(IWING(1).NE.0) GO TO 330                                     VS  6496
      IF(NASYM.EQ.1) GO TO 48                                         VS  6497
      IF(ABS(CLT).LE.0.001) GO TO 48                                  VS  6498
      IF(NGRD.NE.0) GO TO 48                                          VS  6499
      IF(IDIH.NE.0) GO TO 48                                          VS  6500
      IF(KF.NE.0) GO TO 48                                            VS  6501
      CALL DRAG(CLT,YBREAK,NC,TFLP,NAL)                               VS  6502
      GO TO 48                                                        VS  6503
  330 WRITE(JPT,331) CLW(1)                                           VS  6504
      WRITE(JPT,332) CDW(1)                                           VS  6505
      WRITE(JPT,333) CMW(1)                                           VS  6506
      IF(IWING(1).EQ.0) GO TO 2103                                    VS  6507
      CLWLT=CLW(1)-CLWL(1)                                            VS  6508
      CMWLT=CMW(1)-CMWL(1)                                            VS  6509
      CDWLT=CDW(1)-CDWL(1)                                            VS  6510
      WRITE(JPT,2104) CLWLT                                           VS  6511
      WRITE(JPT,2106) CDWLT                                           VS  6512
      WRITE(JPT,2105) CMWLT                                           VS  6513
 2104 FORMAT(/5X,30HTHE WINGLET LIFT COEFFICIENT =,F10.6,20H(BASED ON WIVS  6514
     1NG AREA))                                                       VS  6515
 2105 FORMAT(/5X,41HTHE WINGLET PITCHING MOMENT COEFFICIENT =,F10.6,/10XVS  6516
     1,29H(BASED ON REFERENCE GEOMETRY))                              VS  6517
 2106 FORMAT(/5X,38HTHE WINGLET INDUCED DRAG COEFFICIENT =,F10.6,20H(BASVS  6518
     1ED ON WING AREA))
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2103 CONTINUE                                                          VS  6519
1397 FORMAT (/5X,16H*** TAIL SURFACE,I3,4H ***/)                       VS  6520
     IF(NSUR.EQ.1) GO TO 48                                            VS  6521
     K2 = NSUR - 1                                                     VS  6522
     DO 1398 I=1,K2                                                    VS  6523
     WRITE(JPT,1397) I                                                 VS  6524
     CLTLW=CLW(I+1)-CLW(I)                                             VS  6525
     CMTAIL=CMW(I+1)-CMW(I)                                            VS  6526
     CDTL=CDW(I+1)-CDW(I)                                              VS  6527
     WRITE(JPT,334) CLTLW                                              VS  6528
     WRITE(JPT,329) CDTL                                               VS  6529
     WRITE(JPT,335)                                                    VS  6530
     WRITE(JPT,336) CMTAIL                                             VS  6531
1398 CONTINUE                                                          VS  6532
  48 CONTINUE                                                          VS  6533
     WRITE(JPT,81)                                                     VS  6534
     IF (IALP .EQ. 0) GO TO 341                                        VS  6535
     WRITE (JPT,8)                                                     VS  6536
     CTIP = CTIP*2                                                     VS  6537
     WRITE (JPT,345)                                                   VS  6538
     WRITE(JPT,342) CLT,CSL,CTIP,CSAUG                                 VS  6539
     WRITE(JPT,343) XBP,XLEBAR,CTX,XAUGB                               VS  6540
     WRITE (JPT,8)                                                     VS  6541
     GO TO 346                                                         VS  6542
 342 FORMAT(/2X,4HKP =,F10.5,3X,6HKVLE =,F10.5,3X,6HKVSE =,F10.5,3X,   VS  6543
    17HKVAUG =,F10.5)                                                  VS  6544
 343 FORMAT(/2X,5HXBP =,F10.5,3X,6HXBLE =,F10.5,3X,6HXBSE =,F10.5,3X,  VS  6545
    17HXBAUG =,F10.5)                                                  VS  6546
 345 FORMAT (/2X,66HTHE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF VS  6547
    1SUCTION ANALOGY)                                                  VS  6548
 341 CONTINUE                                                          VS  6549
     CLF=0.                                                            VS  6550
     CMF=0.                                                            VS  6551
     CDF=0.                                                            VS  6552
     IF (KF .EQ. 0) GO TO 362                                          VS  6553
     S=XTEF-XLEF                                                       VS  6554
     SS=SINA                                                           VS  6555
     CS=COSA                                                           VS  6556
     CALL CPFUS(NCUM,NT,SCH,CPF,NF,S,XLEF,XF,XAS,LPANEL,LPAN1,NKF,NW,  VS  6557
    1B,AM,SS,CS,SNP,FO,F10,WARD,IWING,CREF,O,NC1,YPREAK,DCOS,DSIN,IV,  VS  6558
    2LPN,NS,NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)                            VS  6559
     CALL FUSLFT(CPF,HALFSW,CREF,SS,CS,O,XREF,CLF,CMF,CDF)             VS  6560
     BREAK(6,10)=CLF                                                   VS  6561
     IF(KALP.GE.2.AND.ABS(AI).GT.0.001) GO TO 93                       VS  6562
     IF (LAT .NE. 1) GO TO 362                                         VS  6563
     G10=0.                                                            VS  6564
     SS=0.                                                             VS  6565
     CS=1.                                                             VS  6566
     CALL CPFUS(NCUM,NT,GAMB,CPF,NF,S,XLEF,XF,XAS,LPANEL,LPAN1,NKF,NW, VS  6567
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     1B,AM,SS,CS,SNP,FO,G10,WARD,IWING,CREF,2,NC1,YBREAK,DCOS,DSIN,IV,   VS   6568
     2LPN,NS,NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)                            VS   6569
      CALL FUSLFT(CPF,HALFSW,CREF,SS,CS,2,XREF,CYF,CNBF,CKF)            VS   6570
C     WRITE(JPT,2) CYF,CNBF                                             VS   6571
      PX=CYF/BK                                                         VS   6572
      PY=CNBF/BK*CREF/(2.*HALFB(1))                                     VS   6573
      CY=CY+PX                                                          VS   6574
      CNB=CNB+PY                                                        VS   6575
      CYBVSE=CYBVSE+PX                                                  VS   6576
      CNBVSE=CNBVSE+PY                                                  VS   6577
      CYBV=CYBV+PX                                                      VS   6578
      CNBV=CNBV+PY                                                      VS   6579
      SS=0.                                                             VS   6580
      CS=1.                                                             VS   6581
      CALL CPFUS(NCUM,NT,GAMR,CPF,NF,S,XLEF,XF,XAS,LPANEL,LPAN1,NKF,NW, VS   6582
     1B,AM,SS,CS,SNP,FO,G10,WARD,IWING,CREF,3,NC1,YBREAK,DCOS,DSIN,IV,   VS   6583
     2LPN,NS,NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)                            VS   6584
      CALL FUSLFT(CPF,HALFSW,CREF,SS,CS,3,XREF,CYRF,CNRF,CKF)           VS   6585
      PY=CNRF/RL*CREF/(2.*HALFB(1))                                     VS   6586
C     WRITE(JPT,2) CYRF,CNRF                                            VS   6587
      CYR=CYR+CYRF                                                      VS   6588
      CNR=CNR+PY                                                        VS   6589
      CYRSE=CYRSE+SS                                                    VS   6590
      CNRVSE=CNRVSE+PY                                                  VS   6591
      CYRV=CYRV+SS                                                      VS   6592
      CNRV=CNRV+PY                                                      VS   6593
  362 CONTINUE                                                          VS   6594
      IF(KALP.GE.2.AND.ABS(AI).GT.0.001) GO TO 93                       VS   6595
      WRITE(JPT,8)                                                      VS   6596
      WRITE(JPT,920) ALP,AM                                             VS   6597
      WRITE(JPT,8)                                                      VS   6598
      CLTT=CLT+CLF                                                      VS   6599
      CDTT=CDT+CDF                                                      VS   6600
      CMTT=CMT+CMF                                                      VS   6601
      WRITE(JPT,921) CLT,CLF,CLTT                                       VS   6602
      WRITE(JPT,922) CDT,CDF,CDTT                                       VS   6603
      WRITE(JPT,923) CMT,CMF,CMTT                                       VS   6604
  920 FORMAT(/2X,43HSUMMARY OF ATTACHED FLOW RESULTS AT ALPHA =,F7.3,2X,VS   6605
     15HDEG.,,2X,3HM =,F7.3)                                            VS   6606
  921 FORMAT(/4X,8HCL(LS) =,F10.5,3X,5HCLF =,F10.5,3X,4HCL =,F10.5)     VS   6607
  922 FORMAT(/4X,8HCD(LS) =,F10.5,3X,5HCDF =,F10.5,3X,4HCD =,F10.5)     VS   6608
  923 FORMAT(/4X,8HCM(LS) =,F10.5,3X,5HCMF =,F10.5,3X,4HCM =,F10.5)     VS   6609
      CLT=CLPP+CSL+CLVS+CLAUG+CLGM+CLDV+CLF                             VS   6610
      CDT=CDPP+CDVL+CDVS+CDAUG+CDGM+CDDV+CDF                            VS   6611
      CMTT=CMT+CSXL+CMVS+CMAUG+CMGM+CMDV+CMF                            VS   6612
      WRITE(JPT,8)                                                      VS   6613
      WRITE(JPT,345)                                                    VS   6614
      WRITE(JPT,347) CLPP,CSL,CLVS,CLAUG                                VS   6615
      WRITE(JPT,348) CDPP,CDVL,CDVS,CDAUG                               VS   6616
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      WRITE(JPT,349) CMT,CSXL,CMVS,CMAUG                                VS  6617
      WRITE(JPT,355) CLGM,CLDV,CLF,CLT                                  VS  6618
      WRITE(JPT,356) CDGM,CDDV,CDF,CDT                                  VS  6619
      WRITE(JPT,357) CMGM,CMDV,CMF,CMTT                                 VS  6620
      WRITE(JPT,354) CAX,CAXV                                           VS  6621
      WRITE(JPT,8)                                                      VS  6622
  346 CONTINUE                                                          VS  6623
  347 FORMAT(/2X,5HCLP =,F10.5,3X,7HCLVLE =,F10.5,3X,7HCLVSE =,F10.5,3X,VS  6624
     1 8HCLVAUG =,F10.5)                                                VS  6625
  348 FORMAT(/2X,5HCDP =,F10.5,3X,7HCDVLE =,F10.5,3X,7HCDVSE =,F10.5,3X,VS  6626
     1 8HCDVAUG =,F10.5)                                                VS  6627
  349 FORMAT(/2X,5HCMP =,F10.5,3X,7HCMVLE =,F10.5,3X,7HCMVSE =,F10.5,3X,VS  6628
     1 8HCMVAUG =,F10.5)                                                VS  6629
  354 FORMAT(/2X,6HCAXP =,F10.5,3X,6HCAXV =,F10.5)                      VS  6630
  355 FORMAT(/2X,7HCLDVP =,F10.5,2X,7HCLDVV =,F10.5,2X,5HCLF =,F10.5,2X,VS  6631
     1 4HCL =,F10.5)                                                    VS  6632
  356 FORMAT(/2X,7HCDDVP =,F10.5,2X,7HCDDVV =,F10.5,2X,5HCDF =,F10.5,2X,VS  6633
     1 4HCD =,F10.5)                                                    VS  6634
  357 FORMAT(/2X,7HCMDVP =,F10.5,2X,7HCMDVV =,F10.5,2X,5HCMF =,F10.5,2X,VS  6635
     1 4HCM =,F10.5)                                                    VS  6636
  331 FORMAT(/5X,27HTHE WING LIFT COEFFICIENT =,F10.5)                  VS  6637
  332 FORMAT(/5X,35HTHE WING INDUCED DRAG COEFFICIENT =,F10.5)          VS  6638
  333 FORMAT(/5X,38HTHE WING PITCHING MOMENT COEFFICIENT =,F10.5)       VS  6639
  334 FORMAT(/5X,27HTHE TAIL LIFT COEFFICIENT =,F10.5,21H( BASED ON WINGVS  6640
     1 AREA))                                                           VS  6641
  329 FORMAT(/5X,35HTHE TAIL INDUCED DRAG COEFFICIENT =,F10.5,21H( BASEDVS  6642
     1 ON WING AREA))                                                   VS  6643
  335 FORMAT(/5X,65HTHE TAIL PITCHING MOMENT COEFFICIENT BASED ON PEFEREVS  6644
     1NCE WING AREA)                                                    VS  6645
  336 FORMAT(/10X,49HAND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS =, VS  6646
     1F10.5)                                                            VS  6647
   81 FORMAT(/5X,68H(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICVS  6648
     1AL LOADING ONLY))                                                 VS  6649
      HW=2.*HALFSW                                                      VS  6650
      IF(NASYM.EQ.1) HW=HALFSW                                          VS  6651
      HSH=HW                                                            VS  6652
      FACTOR=HALFB(1)/BREF2                                             VS  6653
      FBREF=2.*BREF2                                                    VS  6654
      IF (LAT .EQ. 0) GO TO 45                                          VS  6655
      WRITE(JPT,2021) FBREF,HW                                          VS  6656
 2021 FORMAT(2X,53HTHE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ONVS  6657
     1,/5X,19HA REFERENCE SPAN OF,F10.5,2X,23HAND A REFERENCE AREA OF,  VS  6658
     2F10.5)                                                            VS  6659
      IF(LAT.NE.(-1)) GO TO 1361                                        VS  6660
      WRITE(JPT,46) AF,AM                                               VS  6661
      WRITE(JPT,1364)BREF2                                              VS  6662
      CLL=CLL*FACTOR                                                    VS  6663
      CNL=CNL*FACTOR                                                    VS  6664
      CLLV=CLLV*FACTOR                                                  VS  6665
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      CNLV=CNLV*FACTOR                                                  VS  6666
      CLNSF=CLNSF*FACTOR                                                VS  6667
      CNNSE=CNNSE*FACTOR                                                VS  6668
      CLNSEV=CLNSEV*FACTOR                                              VS  6669
      CNNSEV=CNNSEV*FACTOR                                              VS  6670
      WRITE(JPT,1362) CLL,CNL                                           VS  6671
      WRITE(JPT,1375) CLNSF,CNNSE                                       VS  6672
      WRITE(JPT,1363) CLLV,CNLV                                         VS  6673
      WRITE(JPT,1376) CLNSEV,CNNSEV                                     VS  6674
 1362 FORMAT(/2X,21HATTACHED-FLOW RESULTS,5X,4HCL =,F10.6,2X,4HCN =,    VS  6675
     1F10.6,2X,25H(WITH TIP-SUCTION EFFECT))                            VS  6676
 1363 FORMAT(/2X,19HVORTEX-FLOW RESULTS,7X,4HCL =,F10.6,2X,4HCN =,F10.6,VS  6677
     12X,24H(WITH TIP-VORTEX EFFECT))                                   VS  6678
 1375 FORMAT(/28X,4HCL =,F10.6,2X,4HCN =,F10.6,2X,28H(WITHOUT TIP-SUCTIOVS  6679
     1N EFFECT))                                                        VS  6680
 1376 FORMAT(/28X,4HCL =,F10.6,2X,4HCN =,F10.6,2X,27H(WITHOUT TIP-VORTEXVS  6681
     1 EFFECT))                                                         VS  6682
 1361 CONTINUE                                                          VS  6683
      IF(LAT.NE.1) GO TO 45                                             VS  6684
      WRITE(JPT,8)                                                      VS  6685
      WRITE(JPT,241)                                                    VS  6686
      WRITE(JPT,8)                                                      VS  6687
  241 FORMAT(/2X,48H*STABILITY DERIVATIVES BY POTENTIAL FLOW THEORY*)    VS  6688
  242 FORMAT(/2X,51H*STABILITY DERIVATIVES WITH EDGE VORTEX SEPARATION*)VS  6689
      KA=1                                                              VS  6690
  239 CONTINUE                                                          VS  6691
      IF(KA.GT.3) GO TO 45                                              VS  6692
      WRITE(JPT,230) ALZ                                                VS  6693
  230 FORMAT(//2X,45H***STABILITY DERIVATIVES EVALUATED AT ALPHA =,F8.3,VS  6694
     12X,7HDEGREES)                                                     VS  6695
      WRITE(JPT,231) AM                                                 VS  6696
  231 FORMAT(5X,16HAND AT MACH NO.=,F5.2,37H,BASED ON BODY AXES(IN PER RVS  6697
     1ADIAN)***)                                                        VS  6698
      IF(KA.EQ.2) WRITE(JPT,238)                                        VS  6699
      IF(KA.EQ.3) WRITE(JPT,237)                                        VS  6700
      CLB=CLB*FACTOR                                                    VS  6701
      CNB=CNB*FACTOR                                                    VS  6702
      CLP=CLP*FACTOR                                                    VS  6703
      CNP=CNP*FACTOR                                                    VS  6704
      CLRR=CLRR*FACTOR                                                  VS  6705
      CNR=CNR*FACTOR                                                    VS  6706
      WRITE(JPT,232) CY,CLB,CNB                                         VS  6707
      WRITE(JPT,233) CYP,CLP,CNP                                        VS  6708
      WRITE(JPT,234) CYR,CLRR,CNR                                       VS  6709
  232 FORMAT(/5X,5HCYB =,F12.7,2X,5HCLB =,F12.7,2X,5HCNB =,F12.7)       VS  6710
  233 FORMAT(/5X,5HCYP =,F12.7,2X,5HCLP =,F12.7,2X,5HCNP =,F12.7)       VS  6711
  234 FORMAT(/5X,5HCYR =,F12.7,2X,5HCLR =,F12.7,2X,5HCNR =,F12.7)       VS  6712
      WRITE(JPT,235)                                                    VS  6713
  235 FORMAT(//2X,51H***STABILITY DERIVATIVES BASED ON STABILITY AXES***VS  6714
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     1)                                                                 VS  6715
                                                                        VS  6716
      CYBB=CY                                                           VS  6717
      CLBB=CLB*COSA+CNB*SINA                                            VS  6718
      CNBB=CNB*COSA-CLB*SINA                                            VS  6719
      CYPP=CYP*COSA+CYR*SINA                                            VS  6720
      CLPP=CLP*COSA*COSA+(CLRR+CNP)*COSA*SINA+CNR*SINA*SINA             VS  6721
      CNPP=CNP*COSA*COSA+(CNR-CLP)*COSA*SINA-CLRR*SINA*SINA             VS  6722
      CYRR=CYR*COSA-CYP*SINA                                            VS  6723
      CLRL=CLRR*COSA*COSA+(CNR-CLP)*SINA*COSA-CNP*SINA*SINA             VS  6724
      CNRR=CNR*COSA*COSA-(CLRR+CNP)*SINA*COSA+CLP*SINA*SINA             VS  6725
      WRITE(JPT,232) CYBB,CLBB,CNBB                                     VS  6726
      WRITE(JPT,233) CYPP,CLPP,CNPP                                     VS  6727
      WRITE(JPT,234) CYRR,CLRL,CNRR                                     VS  6728
      IF(KA.EQ.1) WRITE(JPT,8)                                          VS  6729
      IF(KA.EQ.1) WRITE(JPT,242)                                        VS  6730
      IF(KA.EQ.1) WRITE(JPT,8)                                          VS  6731
  238 FORMAT(/5X,48H**INCLUDING THE EFFECT OF LF AND SE VORTEX LIFT*)   VS  6732
  237 FORMAT(/5X,40H*INCLUDING THE EFFECT OF LE VORTEX LIFT*)           VS  6733
      IF(KA.GT.2) GO TO 45                                              VS  6734
      KA=KA+1                                                           VS  6735
      IF(KA.EQ.2) GO TO 236                                             VS  6736
      CY=CYBVSE                                                         VS  6737
      CNB=CNBVSE                                                        VS  6738
      CLB=CLBVSE                                                        VS  6739
      CYP=CYPVSE                                                        VS  6740
      CLP=CLPVSE                                                        VS  6741
      CNP=CNPVSE                                                        VS  6742
      CYR=CYRSE                                                         VS  6743
      CLRR=CLRVSE                                                       VS  6744
      CNR=CNRVSE                                                        VS  6745
      GO TO 239                                                         VS  6746
  236 CY=CYBV                                                           VS  6747
      CNB=CNBV                                                          VS  6748
      CLB=CLBV                                                          VS  6749
      CYP=CYPV                                                          VS  6750
      CLP=CLPV                                                          VS  6751
      CNP=CNPV                                                          VS  6752
      CYR=CYRV                                                          VS  6753
      CLRR=CLRRV                                                        VS  6754
      CNR=CNRV                                                          VS  6755
      GO TO 239                                                         VS  6756
   46 FORMAT(/2X,59HTHE LATERAL CONTROL PARAMETERS DUE TO AILERON DEFLECVS  6757
     1TION OF,F8.3,2X,4HDEG.,2X,6HAT M =,F8.3)                          VS  6758
 1364 FORMAT(/5X,34HBASED ON STABILITY AXES, AND B/2 =,F10.5)           VS  6759
   45 CONTINUE                                                          VS  6760
      WRITE(JPT,337) HW,HALFB(1)                                        VS  6761
  337 FORMAT(//64H THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON VS  6762
     10*S*(B/2),,/15X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5)           VS  6763
      WRITE(JPT,359)
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359 FORMAT(10X,34H(FOP ATTACHED POTENTIAL FLOW ONLY))                    VS   6764
    WRITE (JPT,338)                                                     VS   6765
338 FORMAT (/9X,3HY/S,11X,9HBM(RIGHT),6X,8HBM(LEFT))                    VS   6766
340 FORMAT(/4X,66HTHE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON    VS   6767
   1WING GEOMETRY,,/10X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5)         VS   6768
351 FORMAT(/4X,68HTHE FOLLOWING ARE THE WINGLET CHARACTERISTICS BASED    VS   6769
   1ON WING GEOMETRY,/10X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5)       VS   6770
    KCH=1                                                               VS   6771
    DO 1396 K=1,NSUR                                                    VS   6772
    HAB=HALFB(K)                                                        VS   6773
    KA=NS(K)                                                            VS   6774
    IF(K.GT.1) KA=KA-NS(K-1)                                            VS   6775
    IF(K.EQ.2) WRITE(JPT,340) HW,HAB                                    VS   6776
    IF(K.GT.1) WRITE(JPT,1213)                                          VS   6777
    KB=K-1                                                              VS   6778
    IF(K.GT.1) WRITE(JPT,1397) KB                                       VS   6779
    IF(K.GT.1) WRITE(JPT,1213)                                          VS   6780
    DO 339 I=1,KA                                                       VS   6781
    JWING=IWING(K)                                                      VS   6782
    IF (IWGLT(K).EQ.0) GO TO 350                                        VS   6783
    IF (I .EQ. (JWING+1)) WRITE (JPT,351) HW,HALFB(1)                   VS   6784
                                                                        VS   6785
350 CONTINUE                                                            VS   6786
    IF (IWING(K).NE.0.AND.I.GT.IWING(K)) HAB=HALFBH(K)                  VS   6787
    IF (I.GT.IWING(K).AND.IWGLT(K).EQ.2) HAB=HALFB(K)                   VS   6788
    YE=YLE(KCH)/HAB                                                     VS   6789
    KCH=KCH+1                                                           VS   6790
    IF(I.NE.KA) GO TO 339                                               VS   6791
    IF(NW(K,2).EQ.0) GO TO 339                                          VS   6792
    IF(K.EQ.1) KCH=KCH+NS(K)                                            VS   6793
    IF(K.GT.1) KCH=KCH+NS(K)-NS(K-1)                                    VS   6794
339 WRITE(JPT,32) YE,BMR(K,I),BML(K,I)                                  VS   6795
    WRITE (JPT,1213)                                                    VS   6796
1213 FORMAT (1H0)                                                       VS   6797
    IF(K.EQ.1) WRITE(JPT,1210) CBMR(K),CBML(K)                          VS   6798
1210 FORMAT(69H THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN  VS   6799
   1AND WING AREA, /15X,18HAT THE WING ROOT =,F10.6,2X,8H(RIGHT),,2X,   VS   6800
   21H=,F10.6,2X,6H(LEFT))                                              VS   6801
    WRITE (JPT,1213)                                                    VS   6802
    IF(K.GT.1) WRITE(JPT,1411) CBMR(K),CBML(K)                          VS   6803
    IF(IWING(K).NE.0.AND.IWGLT(K).NE.1) WRITE(JPT,1211)CBTR(K),CBTL(K)VS   6804
1211 FORMAT(68H THE BENDING MOMENT COEFFICIENT BASED ON FIN HALF SPAN AVS   6805
   1ND WING AREA,/15X,17HAT THE FIN ROOT = ,F10.6,2X,8H(RIGHT),,2X,1H=VS   6806
   2,F10.6,2X,6H(LEFT))                                                 VS   6807
    IF(IWGLT(K).EQ.1) WRITE(JPT,1214) CBTR(K),CBTL(K)                   VS   6808
1214 FORMAT(2X,68HTHE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAVS   6809
   1N AND WING AREA/10X,21HAT THE WINGLET ROOT =,F10.6,2X,8H(RIGHT),,  VS   6810
   22X,1H=,F10.6,2X,6H(LEFT))                                           VS   6811
1411 FORMAT(2X,68HTHE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAVS   6812
   1N AND WING AREA/10X,18HAT THE TAIL ROOT =,F10.6,2X,8H(RIGHT),,2X,   VS   6813
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     21H=,F10.6,2X,6H(LEFT))                                                    VS  6813
                                                                                VS  6814
1396 CONTINUE                                                                   VS  6815
  93 CONTINUE                                                                   VS  6816
     ALPII=ALP                                                                  VS  6817
     CLII=CLTOT                                                                 VS  6818
     ALP=ALO+ALPINC                                                             VS  6819
     IF(KALP.LT.2.AND.KI.LT.NALP) ALP=ALPA(KI+1)                                VS  6820
     ALO=ALP                                                                    VS  6821
     ALZ=ALO*180./PI                                                            VS  6822
     LAT=LATT                                                                   VS  6823
     RETURN                                                                     VS  6824
     END                                                                        VS  6825
C      FORTRAN NLSTIN                                                           VS  6826
      SUBROUTINE CPFUS(NT,N,B,CPF,NF,S,XLEF,XF,XAS,LPANEL,LPAN1,NKF,NW,         VS  6827
     188,AM,SS,CS,SNP,FO,F10,WARD,IWING,CREF,L,NC1,YK,DC,DS,IV,LPN,NS,          VS  6828
     2NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)                                           VS  6829
C      CALCULATE PRESSURE COEFF. ON FUSELAGE                                    VS  6830
      DIMENSION B(1),XF(1),PF(20),SNP(5,20),WARD(1),NKF(1),XAS(1)               VS  6831
      DIMENSION CPF(10,20),U(8),V(8),LPAN1(1),NW(6,1)                           VS  6832
      DIMENSION IWING(1),YK(6,1),DC(6,1),DS(6,1),IV(1),LPN(1),NS(1)             VS  6833
      DIMENSION IWGLT(1),NC(1),BREAK(6,1)                                       VS  6834
   36 FORMAT (8(6X,I4))                                                         VS  6835
      PI=3.14159265                                                             VS  6836
      PI4=4.*PI                                                                 VS  6837
      FNT=NF                                                                    VS  6838
      XTEF=XLEF+S                                                               VS  6839
      NF1=NF-1                                                                  VS  6840
      TH1=SNP(5,20)                                                             VS  6841
      NH1=SNP(5,19)                                                             VS  6842
      NZ=1                                                                      VS  6843
      IF (L .NE. 0) NZ=2                                                        VS  6844
      FL=0.                                                                     VS  6845
      FL1=0.                                                                    VS  6846
      FNK=NKF(1)                                                                VS  6847
      SL=XAS(2)-XAS(1)                                                          VS  6848
      MM=NKF(1)                                                                 VS  6849
      ND=1                                                                      VS  6850
      NN=0                                                                      VS  6851
      DO 15 I=1,NF                                                              VS  6852
      II=I+LPANEL                                                               VS  6853
      IP=I-NN                                                                   VS  6854
      XC=XF(I)                                                                  VS  6855
      RF(I)=FUR(XC)                                                             VS  6856
      FL1=FL1+B(II)*SNP(ND,IP)*SL/FNK                                           VS  6857
      FL=FL+WARD(I)*SNP(ND,IP)*SL/FNK                                           VS  6858
      IF (I .LT. MM .OR. I .EQ. NF) GO TO 15                                    VS  6859
      ND=ND+1                                                                   VS  6860
      NN=MM                                                                     VS  6861
      MM=MM+NKF(ND)
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      SL=XAS(ND+1)-XAS(ND)                                              VS  6862
      FNK=NKF(ND)                                                       VS  6863
   15 CONTINUE                                                          VS  6864
      FL=F0+0.5*PI*FL                                                   VS  6865
      FL1=F10+0.5*PI*FL1                                                VS  6866
      DO 1 I=1,NF                                                       VS  6867
      A1=XF(I)-XTEF                                                     VS  6868
      A2=SQRT(A1*A1+BB*RF(I)*RF(I))                                     VS  6869
      XP=XF(I)-XLEF                                                     VS  6870
      A6=SQRT(XP*XP+BB*RF(I)*RF(I))                                     VS  6871
      RFTL=-(A1+A2)/RF(I)                                               VS  6872
      RFT0=-(XP+A6)/RF(I)                                               VS  6873
      J=0                                                               VS  6874
      IF (L .NE. 0) J=1                                                 VS  6875
    2 CONTINUE                                                          VS  6876
      II=I+NF*(J-1)+LPANEL                                              VS  6877
      FNK=NKF(1)                                                        VS  6878
      SL=XAS(2)-XAS(1)                                                  VS  6879
      MM=NKF(1)                                                         VS  6880
      ND=1                                                              VS  6881
      NN=0                                                              VS  6882
      FJ=J                                                              VS  6883
      U(J+1)=0.                                                         VS  6884
      V(J+1)=0.                                                         VS  6885
      IF (J .GT. 2 .AND. I .EQ. NF) GO TO 20                            VS  6886
      RFL=-((A1+A2)/RF(I))**J/A2                                        VS  6887
      RF0=-((XP+A6)/RF(I))**J/A6                                        VS  6888
      IF (J .LT. 2) GO TO 16                                            VS  6889
      RFTL=0.                                                           VS  6890
      RFT0=0.                                                           VS  6891
   16 CONTINUE                                                          VS  6892
      DO 10 KC=1,NF                                                     VS  6893
      IP=KC-NN                                                          VS  6894
      B1=XF(I)-XF(KC)                                                   VS  6895
      B2=SQRT(B1*B1+BB*RF(I)*RF(I))                                     VS  6896
      RFX=-((B1+B2)/RF(I))**J/B2                                        VS  6897
      KK=KC+NF*(J-1)+LPANEL                                             VS  6898
      IF (J.EQ. 0) GO TO 12                                             VS  6899
      U(J+1)=U(J+1)-(B(KK)-B(II))*RFX*SNP(ND,IP)*SL/FNK                 VS  6900
      IF (J .EQ. 0) GO TO 11                                            VS  6901
      RFTX=-((B1+B2)/RF(I))**J/FJ                                       VS  6902
      V(J+1)=V(J+1)+B(KK)*SNP(ND,IP)*(RFTX-RFTL)*SL/FNK                 VS  6903
      GO TO 11                                                          VS  6904
   12 U(J+1)=U(J+1)-(WARD(KC)-WARD(I))*RFX*SNP(ND,IP)*SL/FNK            VS  6905
   11 IF (KC .LT. MM .OR. KC .EQ. NF) GO TO 10                          VS  6906
      ND=ND+1                                                           VS  6907
      NN=MM                                                             VS  6908
      MM=MM+NKF(ND)                                                     VS  6909
      SL=XAS(ND+1)-XAS(ND)                                              VS  6910
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      FNK=NKF(ND)                                                       VS  6911
   10 CONTINUE                                                          VS  6912
      IF (J .EQ. 1) V(J+1)=(-V(J+1)*0.5*PI+(RFTL-RFTO)*F10)/(4.*PI)     VS  6913
      IF(J.GT.1) V(J+1)=-V(J+1)*0.125                                   VS  6914
      IF(J.EQ.0) U(J+1)=-(FL*RFL-FO*RFO+U(J+1)*0.5*PI-WARD(I)*ALOG((A1  VS  6915
     1+A2)/(XP+A6)))/PI4                                                VS  6916
      IF (J .EQ. 1) U(J+1)=-(FL1*RFL-F10*RFO+U(J+1)*0.5*PI+B(II)/FJ*(RFLVS  6917
     1*A2-RFO*A6))/(4.*PI)                                              VS  6918
      IF (J .GT. 1) U(J+1)=-(U(J+1)*0.5*PI+B(II)/FJ*(RFL*A2-RFO*A6))/(4.VS  6919
     1*PI)                                                              VS  6920
      V(J+1)=V(J+1)/RF(I)                                               VS  6921
   20 CONTINUE                                                          VS  6922
      J=J+1                                                             VS  6923
      IF (J .LE. N) GO TO 2                                             VS  6924
      N1=2                                                              VS  6925
      IF (L .NE. 0) N1=N+1                                              VS  6926
      DO 25 K=1,NT                                                      VS  6927
      IF (NH1 .NE. 0 .AND. K .LE. NH1) GO TO 45                         VS  6928
      FK=K-NH1                                                          VS  6929
      FT=NT-NH1                                                         VS  6930
      PP=PI-TH1                                                         VS  6931
      TP=TH1                                                            VS  6932
      GO TO 46                                                          VS  6933
   45 FK=K                                                              VS  6934
      FT=NH1                                                            VS  6935
      PP=TH1                                                            VS  6936
      TP=0.                                                             VS  6937
   46 CONTINUE                                                          VS  6938
      THETA=(2.*FK-1.)*PP/(2.*FT)+TP                                    VS  6939
      SINTA=SIN(THETA)                                                  VS  6940
      COSTA=COS(THETA)                                                  VS  6941
      PHIX=0.                                                           VS  6942
      PHIT=0.                                                           VS  6943
      DO 30 J=NZ,N1                                                     VS  6944
      FJ=J                                                              VS  6945
      IF (L .LE. 1) PHIX=PHIX+U(J)*COS((FJ-1.)*THETA)                   VS  6946
      IF (L .GT. 1) PHIX=PHIX+U(J)*SIN((FJ-1.)*THETA)                   VS  6947
      IF (L .LE. 1) PHIT=PHIT+V(J)*(FJ-1.)*SIN((FJ-1.)*THETA)           VS  6948
   30 IF (L .GT. 1) PHIT=PHIT-V(J)*(FJ-1.)*COS((FJ-1.)*THETA)           VS  6949
      X=XF(I)                                                           VS  6950
      Y=RF(I)*SINTA                                                     VS  6951
      Z=RF(I)*COSTA                                                     VS  6952
      CALL UTFW(X,Y,Z,SINTA,COSTA,LPANEL,BB,LPAN1,NW,B,VX,VT,IWING,L,NC1VS  6953
     1,YK,DC,DS,IV,LPN,NS,NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)               VS  6954
      PHIX=PHIX+VX                                                      VS  6955
      PHIT=PHIT+VT                                                      VS  6956
      IF (L .NE. 0) GO TO 40                                            VS  6957
      DRX=SLOP(X)                                                       VS  6958
      DRX=DRX/RF(I)                                                     VS  6959
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      SRX=1./SQRT(1.+DRX*DRX)                                                VS  6960
      DRX=(CS+U(1))*DRX*SRX                                                  VS  6961
      UVEL=CS+PHIX                                                           VS  6962
      VDL=DRX**2+(-SS*SINTA+PHIT)**2                                         VS  6963
      VDIF=1.-UVEL**2-VDL                                                    VS  6964
   35 FORMAT (8F10.5)                                                        VS  6965
      GO TO 41                                                               VS  6966
   40 CONTINUE                                                               VS  6967
      VDIF=-2.*PHIX                                                          VS  6968
   41 CONTINUE                                                               VS  6969
      IF (AM .LE. 0.1) GO TO 26                                              VS  6970
      IF (L .NE. 0) GO TO 26                                                 VS  6971
      AC=1.+0.2*AM*AM*VDIF                                                   VS  6972
      IF (AC .LT. 0.) GO TO 34                                               VS  6973
      CPF(K,I)=2./(1.4*AM*AM)*(AC**3.5-1.)                                   VS  6974
      GO TO 25                                                               VS  6975
   34 CPF(K,I)=VDIF+AM*AM*PHIX*PHIX+AM*AM*PHIX*VDL+AM*AM*0.25*VDL*VDL        VS  6976
      GO TO 25                                                               VS  6977
   26 CPF(K,I)=VDIF                                                          VS  6978
   25 CONTINUE                                                               VS  6979
    1 CONTINUE                                                               VS  6980
      RETURN                                                                 VS  6981
      END                                                                    VS  6982
C      FORTRAN NLSTIN                                                        VS  6983
      SUBROUTINE UTFW(X,Y,Z,SF,CF,LPANEL,B1,LPAN1,NW,GAMMA,VX,VT,IWING,LVS  6984
     1,NC1,YK,DC,DS,IV,LPN,NS,NGRD,HEIGHT,ATT,IWGLT,NC,BREAK)                VS  6985
C      TO CALCULATE VELOCITIES ON FUSELAGE DUE TO WINGS                      VS  6986
      DIMENSION W(2),NW(6,1),GAMMA(1),U(2),IWGLT(1),NC(1)                    VS  6987
      DIMENSION LPAN1(1),YK(6,1),DC(6,1),DS(6,1),IV(1),LPN(1),NS(1)          VS  6988
      DIMENSION IWING(1),BREAK(6,1)                                          VS  6989
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  6990
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  6991
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  6992
      PI=3.14159265                                                          VS  6993
      IP=1                                                                   VS  6994
      IZ=1                                                                   VS  6995
      IFF=1                                                                  VS  6996
      ISN=1                                                                  VS  6997
      K=1                                                                    VS  6998
      LG=1                                                                   VS  6999
      IF (NGRD .EQ. 1) LG=2                                                  VS  7000
      NASYM=YCON(50)                                                         VS  7001
      IW=1                                                                   VS  7002
      MM=NW(K,1)                                                             VS  7003
      NN=NW(K,1)                                                             VS  7004
      FACTOR=1.                                                              VS  7005
      IF (L .GE. 2) FACTOR=-1.                                               VS  7006
      VX=0.                                                                  VS  7007
      VT=0.                                                                  VS  7008
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      ZA=0.                                                             VS  7009
      YA=BREAK(1,1)                                                     VS  7010
      YAA=BREAK(1,1)                                                    VS  7011
      IF (NASYM .EQ. 0) GO TO 73                                        VS  7012
      YA=YK(1,NC1)                                                      VS  7013
      YAA=YA                                                            VS  7014
      IF (NC1 .EQ. 1) GO TO 73                                          VS  7015
      NC11=NC1-1                                                        VS  7016
      DO 74 J=1,NC11                                                    VS  7017
      ZA=ZA+(YK(K,J)-YK(K,J+1))*DS(K,J+1)                               VS  7018
   74 YAA=YAA+(YK(K,J)-YK(K,J+1))*DC(K,J+1)                             VS  7019
      YA=YK(K,1)                                                        VS  7020
   73 CONTINUE                                                          VS  7021
      YAP=YA                                                            VS  7022
      YAAP=YAA                                                          VS  7023
      IPN=1                                                             VS  7024
      DO 10 J=1,LPANEL                                                  VS  7025
      ISN=1                                                             VS  7026
      MI=J-IFF+1                                                        VS  7027
      COSD=DC(K,IPN)                                                    VS  7028
      SIND=DS(K,IPN)                                                    VS  7029
      IF(J.GT.LPAN1(K).AND.J.LE.LPN(K)) ISN=2                           VS  7030
      IF(J.EQ.LPN(K).AND.J.LT.LPANEL) NN=NW(K+1,1)                      VS  7031
      IF (J .GE. LPAN1(K) .AND. J .LT. LPN(K)) NN=NW(K,2)               VS  7032
      FN=NN                                                             VS  7033
      CHORD=CH(IZ)                                                      VS  7034
      X1=XN(J,1)-X                                                      VS  7035
      X2=XN(J,2)-X                                                      VS  7036
      X12=XN(J,2)-XN(J,1)                                               VS  7037
      Y12=YN(J,2)-YN(J,1)                                               VS  7038
      ISM=2                                                             VS  7039
      IF (IV(K) .EQ. 1) ISM=1                                           VS  7040
      IF (NASYM .EQ. 1) ISM=1                                           VS  7041
      DO 16 II=1,ISM                                                    VS  7042
      FCP=1.                                                            VS  7043
      IF (II .EQ. 2) FCP=-1.                                            VS  7044
      W(II)=0.                                                          VS  7045
      U(II)=0.                                                          VS  7046
      DO 16 KK=1,LG                                                     VS  7047
      Z12=ZN(J,2)-ZN(J,1)+Y12*SIND                                      VS  7048
      Y12=Y12*COSD                                                      VS  7049
      YC=Y*FCP                                                          VS  7050
      Y1=YAA+(YN(J,1)-YA)*COSD-YC                                       VS  7051
      Y2=YAA+(YN(J,2)-YA)*COSD-YC                                       VS  7052
      IF(KK .EQ. 1) GO TO 18                                            VS  7053
      ZC=-2.*(7+HEIGHT)+7                                               VS  7054
      GE=-1.                                                            VS  7055
      FCON=1.                                                           VS  7056
      GO TO 19                                                          VS  7057
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18 ZC=Z                                                                 VS  7058
   GE=1.                                                                VS  7059
   FCON=0.                                                              VS  7060
19 CONTINUE                                                             VS  7061
   Z1=ZN(J,1)-ZC+ZA+(YN(J,1)-YA)*SIND                                   VS  7062
   Z2=ZN(J,2)-ZC+ZA+(YN(J,2)-YA)*SIND                                   VS  7063
   UCOM=-Z1*Y12*(-ATT)*FCON                                             VS  7064
   XZJ=X1*Z12-Z1*X12                                                    VS  7065
   XYK=X1*Y12-Y1*X12                                                    VS  7066
   YZI=Y1*Z12-Z1*Y12                                                    VS  7067
   ALB1=XYK*XYK+XZJ*XZJ+B1*Y7I*YZI                                      VS  7068
   R1B1=SQRT(X1*X1+B1*Y1*Y1+B1*Z1*Z1)                                   VS  7069
   R2B1=SQRT(X2*X2+B1*Y2*Y2+B1*Z2*Z2)                                   VS  7070
   UUB1=(X2*X12+B1*Y2*Y12+B1*Z2*Z12)/R2B1-(X1*X12+B1*Y1*Y12+B1*Z1*Z12VS  7071
  1)/R1B1                                                               VS  7072
   IF (IP .EQ. 1) GO TO 35                                              VS  7073
37 CONTINUE                                                             VS  7074
   G1B1=(1.-X1/R1B1)/(Y1*Y1+Z1*Z1)                                      VS  7075
   GO TO 36                                                             VS  7076
35 IF (L.GE.2.AND.IV(K).EQ.0) GO TO 37                                  VS  7077
   G1B1=0.                                                              VS  7078
36 CONTINUE                                                             VS  7079
   G2B1=(1.-X2/R2B1)/(Y2*Y2+Z2*Z2)                                      VS  7080
   F12=UUB1*(UCOM+XYK)/ALB1*GE                                          VS  7081
   G12=(-Y2*G2B1+Y1*G1B1)*GE                                            VS  7082
   F13=-UUB1*XZJ/ALB1                                                   VS  7083
   G13=Z2*G2B1-Z1*G1B1                                                  VS  7084
   F1=+F13*CF*FCP-F12*SF                                                VS  7085
   F2=G13*CF*FCP-G12*SF                                                 VS  7086
   F3=UUB1*Y7I/ALB1                                                     VS  7087
   U(II)=U(II)+F3*CHORD*SN(K,MI,ISN)*GAMMA(J)/(8.*FN)                   VS  7088
16 W(II)=W(II)+(F1+F2)*CHORD*SN(K,MI,ISN)*GAMMA(J)/(8.*FN)              VS  7089
   VT=W(1)+FACTOR*W(2)+VT                                               VS  7090
   VX=U(1)+FACTOR*U(2)+VX                                               VS  7091
   IF (J .LT. MM) GO TO 17                                              VS  7092
   IF (J .EQ. LPANEL) GO TO 10                                          VS  7093
   IP=IP+1                                                              VS  7094
   IZ=IZ+1                                                              VS  7095
   IW=IW+1                                                              VS  7096
   IFF=MM+1                                                             VS  7097
   MM=MM+NN                                                             VS  7098
   IF(IWING(K).NE.0 .AND.IW.EQ.(IWING(K)+1)) GO TO 14                   VS  7099
   IF(J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) GO TO 32                            VS  7100
   IF(YLE(IZ).LT.YK(K,IPN)) GO TO 17                                    VS  7101
14 CONTINUE                                                             VS  7102
   NJ=0                                                                 VS  7103
   IF(NASYM.EQ.1.AND.IPN.LT.NC1) NJ=1                                   VS  7104
   IF(NJ.EQ.1) IPN=IPN+1                                                VS  7105
   ZA=ZA+(YK(K,IPN)-YA)*DS(K,IPN)                                       VS  7106
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      YAA=YAA+(YK(K,IPN)-YA)*DC(K,IPN)                                  VS  7107
      YA=YK(K,IPN)                                                      VS  7108
      IF (IWING(K).NE.0.AND.IW.EQ.(IWING(K)+1)) GO TO 22                VS  7109
      GO TO 23                                                          VS  7110
   22 IF (IWGLT(K).EQ.1) GO TO 23                                       VS  7111
   32 ZA=0.                                                             VS  7112
      YA=BREAK(K,1)                                                     VS  7113
      YAA=BREAK(K,1)                                                    VS  7114
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YA=YAP                           VS  7115
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(K)) YAA=YAAP                         VS  7116
      IF(J.EQ.LPN(K).AND.K.LT.6) YA=BREAK(K+1,1)                        VS  7117
      IF(J.EQ.LPN(K).AND.K.LT.6) YAA=BREAK(K+1,1)                       VS  7118
      IF(J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) GO TO 23                         VS  7119
      IF (IWGLT(K).NE.2) GO TO 23                                       VS  7120
      ZA=YK(K,NC(K)-2)*DS(K,1)                                          VS  7121
      YAA=YK(K,NC(K)-2)*DC(K,1)                                         VS  7122
      YA=YK(K,NC(K)-2)                                                  VS  7123
   23 CONTINUE                                                          VS  7124
      IF(NJ.NE.1) IPN=IPN+1                                             VS  7125
      IF (J.EQ.LPAN1(K).OR.J.EQ.LPN(K)) IPN=1                           VS  7126
   17 KH=0                                                              VS  7127
      IF(J.EQ.LPAN1(K).AND.J.NE.LPN(K)) KH=1                            VS  7128
      IF(KH.EQ.1.AND.K.EQ.1) IW=IW-NS(K)                                VS  7129
      IF(KH.EQ.1.AND.K.GT.1) IW=IW-NS(K)+NS(K-1)                        VS  7130
      IF(J.EQ.LPAN1(K)) IP=1                                            VS  7131
      IF(J.EQ.LPN(K)) IP=1                                              VS  7132
   10 IF (J .EQ. LPN(K)) K=K+1                                          VS  7133
      RETURN                                                            VS  7134
      END                                                               VS  7135
C      FORTRAN NLSTIN                                                   VS  7136
      SUBROUTINE FUSLFT(CPF,HALFSW,CREF,SS,CS,L,XREF,CLLF,SPM,CDL)      VS  7137
C     TO CALCULATE FUSELAGE FORCES AND MOMENTS                          VS  7138
      DIMENSION AW(21),CST(15),CTL(20),RP(20),CPF(10,20),CA(20)         VS  7139
      DIMENSION BW(21),CB(20)                                           VS  7140
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),  VS  7141
     1NCUM,NF,NT,CSF(5,10),XAS(6),NKF(5),F0,F10,KF,NTL,LWF,WKN,RDX,X1   VS  7142
      COMMON /INOUT/ INPT,JPT                                           VS  7143
      DATA CST /15*0./                                                  VS  7144
      PI=3.14159265                                                     VS  7145
      SLENTH=XTEF-XLEF                                                  VS  7146
      TH1=SNP(5,20)                                                     VS  7147
      NH1=SNP(5,19)                                                     VS  7148
      DO 1 I=1,NF                                                       VS  7149
      XC=XF(I)                                                          VS  7150
    1 RP(I)=FUR(XC)                                                     VS  7151
      FCUM=NCUM                                                         VS  7152
      IF (L .NE. 0) GO TO 40                                            VS  7153
      WRITE (JPT,15)                                                    VS  7154
   15 FORMAT(//1X,58H***FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BVS  7155
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     1ELOW***)                                                                  VS  7156
                                                                                VS  7157
      WRITE (JPT,21)                                                            VS  7158
   21 FORMAT (/5X,65HPRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREESVS      VS  7159
     1 DEFINED BELOW)                                                           VS  7160
      DO 22 I=1,NCUM                                                            VS  7161
      IF (NH1 .NE. 0 .AND. I .LE. NH1) GO TO 70                                 VS  7162
      FI=I-NH1                                                                  VS  7163
      FCUM=NCUM-NH1                                                             VS  7164
      PP=(PI-TH1)*180./PI                                                       VS  7165
      TP=TH1*180./PI                                                            VS  7166
      GO TO 71                                                                  VS  7167
   70 FI=I                                                                      VS  7168
      FCUM=NH1                                                                  VS  7169
      PP=TH1*180./PI                                                            VS  7170
      TP=0.                                                                     VS  7171
   71 CONTINUE                                                                  VS  7172
   22 AW(I)=(2.*FI-1.)*PP/(2.*FCUM)+TP                                          VS  7173
      WRITE (JPT,23) (I,AW(I),I=1,NCUM)                                         VS  7174
   23 FORMAT (// 5(3X,5HTHETA,I2,1H=,F5.1))                                     VS  7175
      WRITE (JPT,24) (I,I=1,NCUM)                                               VS  7176
   24 FORMAT (/5X,3HX/L,9X,5HTHETA,I2,9(5X,5HTHETA,I2))                         VS  7177
      DO 11 I=1,NF                                                              VS  7178
      XC=(XF(I)-XREF)/SLENTH                                                    VS  7179
   11 WRITE (JPT,26)XC     ,(CPF(K,I),K=1,NCUM)                                 VS  7180
   26 FORMAT (11F12.5)                                                          VS  7181
   40 CONTINUE                                                                  VS  7182
      CNF=0.                                                                    VS  7183
      CAF=0.                                                                    VS  7184
      CMF=0.                                                                    VS  7185
      DO 7 I=1,NCUM                                                             VS  7186
      IF (NH1 .NE. 0 .AND. I .LE. NH1) GO TO 72                                 VS  7187
      FI=I-NH1                                                                  VS  7188
      FCUM=NCUM-NH1                                                             VS  7189
      PP=PI-TH1                                                                 VS  7190
      TP=TH1                                                                    VS  7191
      GO TO 73                                                                  VS  7192
   72 FI=I                                                                      VS  7193
      FCUM=NH1                                                                  VS  7194
      PP=TH1                                                                    VS  7195
      TP=0.                                                                     VS  7196
   73 CONTINUE                                                                  VS  7197
      THETA=(2.*FI-1.)*PP/(2.*FCUM)+TP                                          VS  7198
      IF (L .GE. 2) CST(I)=SIN(THETA)                                           VS  7199
    7 IF (L .LT. 2) CST(I)=COS(THETA)                                           VS  7200
      SL=XAS(2)-XAS(1)                                                          VS  7201
      FNK=NKF(1)                                                                VS  7202
      MM=NKF(1)                                                                 VS  7203
      NC=1                                                                      VS  7204
      NN=0
```

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                                                                      VS  7205
      DO 20 I=1,NF                                                    VS  7206
      CPTL=0.                                                         VS  7207
      CPTD=0.                                                         VS  7208
      IP=I-NN                                                         VS  7209
      DO 25 K=1,NCUM                                                  VS  7210
      IF (NH1 .NE. 0 .AND. K .LE. NH1) GO TO 74                       VS  7211
      FCUM=NCUM-NH1                                                   VS  7212
      PP=PI-TH1                                                       VS  7213
      GO TO 75                                                        VS  7214
   74 FCUM=NH1                                                        VS  7215
      PP=TH1                                                          VS  7216
   75 CONTINUE                                                        VS  7217
      CPTD=CPTD+CPF(K,I)*PP/FCUM                                      VS  7218
   25 CPTL=CPTL+CPF(K,I)*CST(K)*PP/FCUM                               VS  7219
      CTL(I)=-2.*CPTL                                                 VS  7220
      IF(I.EQ.NF.AND.ABS(CTL(I)).GT.ABS(CTL(I-1))) CTL(I)=0.5*CTL(I-1) VS  7221
      CPTD=2.*CPTD                                                    VS  7222
      GD=RP(I)*SNP(NC,IP)*CPTD*SL/(2.*FNK)                            VS  7223
      GB=RP(I)*SNP(NC,IP)*CTL(I)*SL/(2.*FNK)                          VS  7224
      CA(I)=GB*FNK/SL                                                 VS  7225
      X=YF(I)                                                         VS  7226
      S=SLENTH                                                        VS  7227
      DRX=SLOP(X)/RP(I)                                               VS  7228
      SQ=SQRT(1.+DRX*DRX)                                             VS  7229
      CA(I)=CA(I)/SQ                                                  VS  7230
      CB(I)=GD*FNK/(SL*SQ)*DRX                                        VS  7231
      CAF=CAF+GD*DRX/SQ                                               VS  7232
      CNF=CNF+GB/SQ                                                   VS  7233
      CMF=CMF+GB*(XF(I)-XREF)/SQ                                      VS  7234
      IF (I .LT. MM .OR. I .EQ. NF) GO TO 20                          VS  7235
      NC=NC+1                                                         VS  7236
      NN=MM                                                           VS  7237
      MM=MM+NKF(NC)                                                   VS  7238
      SL=XAS(NC+1)-XAS(NC)                                            VS  7239
      FNK=NKF(NC)                                                     VS  7240
   20 CONTINUE                                                        VS  7241
      ICK=0                                                           VS  7242
      IF (ABS((XAS(2)-XTEF)/SLENTH) .GT. 0.01) GO TO 54               VS  7243
      ICK=1                                                           VS  7244
      FNF=NF                                                          VS  7245
      NF1=NF+1                                                        VS  7246
      DO 51 J=1,NF1                                                   VS  7247
      AW(J)=0.                                                        VS  7248
      BW(J)=0.                                                        VS  7249
      FJ=J                                                            VS  7250
      DO 52 K=1,NF                                                    VS  7251
      FK=K                                                            VS  7252
      CK=COS((FJ-1.)*(2.*FK-1.)*PI/(2.*FNF))                          VS  7253
      BW(J)=BW(J)+CB(K)*CK
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                                                                      VS  7254
   52 AW(J)=AW(J)+CA(K)*CK                                            VS  7255
      IF (J .EQ. 1) AW(J)=AW(J)/FNF                                   VS  7256
      IF (J .NE. 1) AW(J)=AW(J)*2./FNF                                VS  7257
      IF(J.EQ.1) BW(J)=BW(J)/FNF                                      VS  7258
      IF(J.NE.1) BW(J)=BW(J)*2./FNF                                   VS  7259
   51 CONTINUE                                                        VS  7260
C                                                                     VS  7261
C  * EMPIRICAL METHOD TO FIND THE STATION AT WHICH THE FLOW CEASES TO PEVS  7262
C    POTENTIAL. SEE DATCOM *                                          VS  7263
      XO=0.378+0.527*X1                                               VS  7264
      TH=ACOS(1.-2.*XO)                                               VS  7265
      SUM=AW(1)*TH                                                    VS  7266
      SA=BW(1)*TH                                                     VS  7267
      SMM=-AW(1)*SIN(TH)-0.5*AW(2)*(TH+0.5*SIN(2.*TH))                VS  7268
      DO 53 J=1,NF                                                    VS  7269
      FJ=J                                                            VS  7270
      IF (J.GE.2) SMM=SMM-0.5*AW(J+1)*(SIN((FJ-1.)*TH)/(FJ-1.)+SIN((FJ+1VS  7271
     1.)*TH)/(FJ+1.))                                                 VS  7272
      SK=SIN(FJ*TH)                                                   VS  7273
      SA=SA+BW(J+1)*SK/FJ                                             VS  7274
   53 SUM=SUM+AW(J+1)*SK/FJ                                           VS  7275
      SMM=SMM+SUM                                                     VS  7276
      SUM=SUM*SLENTH/(2.*HALFSW)                                      VS  7277
      SMM=-SMM*SLENTH**2/(4.*HALFSW*CREF)                             VS  7278
      SMM=SMM-(XLEF-XREF)/CREF*SUM                                    VS  7279
      SA=SA*SLENTH/(2.*HALFSW)                                        VS  7280
   54 CONTINUE                                                        VS  7281
      IF (L .NE. 0) GO TO 42                                          VS  7282
      WRITE (JPT,31)                                                  VS  7283
   31 FORMAT (/5X,63HTOTAL PRESSURE LOADING AT EACH X-STATION, BASED ON VS  7284
     1LOCAL RADIUS)                                                   VS  7285
      WRITE (JPT,32)                                                  VS  7286
   32 FORMAT (/5X,3HX/L,9X,6HRADIUS,6X,7HLOADING)                     VS  7287
      DO 33 I=1,NF                                                    VS  7288
      XC=XF(I)/SLENTH                                                 VS  7289
   33 WRITE  (JPT,26) XC,RP(I),CTL(I)                                 VS  7290
   42 CONTINUE                                                        VS  7291
      CLF=CNF*CS-CAF*SS                                               VS  7292
      CDF=CNF*SS+CAF*CS                                               VS  7293
      CDF=CDF*PI/(2.*HALFSW)                                          VS  7294
      CLF=CLF*PI/(2.*HALFSW)                                          VS  7295
      CMF=-CMF*PI/(2.*HALFSW*CREF)                                    VS  7296
      CLLF=SUM*CS-SA*SS                                               VS  7297
      CDL=SUM*SS+SA*CS                                                VS  7298
      SS=CLF                                                          VS  7299
      CS=CMF                                                          VS  7300
      IF (ICK .EQ. 0) GO TO 60                                        VS  7301
      CLF=SUM                                                         VS  7302
      SS=CLF
```

```
                                                                      VS  7303
      CS=SMM                                                          VS  7304
      IF(L.EQ.0) GO TO 60                                             VS  7305
      CLLF=SUM                                                        VS  7306
   60 CONTINUE                                                        VS  7307
      IF (L .NE. 0) GO TO 43                                          VS  7308
      WRITE (JPT,36) CLF                                              VS  7309
      WRITE (JPT,35) CMF                                              VS  7310
      WRITE(JPT,37) CDF                                               VS  7311
      WRITE(JPT,38)                                                   VS  7312
      WRITE(JPT,39) CLLF                                              VS  7313
      WRITE(JPT,44) SMM                                               VS  7314
      WRITE(JPT,37) CDL                                               VS  7315
   43 CONTINUE                                                        VS  7316
   35 FORMAT(/5X,43HTHE FUSELAGE POTENTIAL MOMENT COEFFICIENT =,F10.5) VS  7317
   36 FORMAT (/5X,41HTHE FUSELAGE POTENTIAL LIFT COEFFICIENT =,F10.5) VS  7318
   37 FORMAT (/5X,39HTHE FUSELAGE INDUCED DRAG COEFFICIENT =,F10.5)   VS  7319
   38 FORMAT(2X,/45HTHE FOLLOWING VALUES ARE OBTAINED BY IGNORING/46HTHEVS  7320
     1 AFT VISCOSITY-DOMINATED REGION. SEE DATCOM)                    VS  7321
   39 FORMAT(/5X,31HTHE FUSELAGE LIFT COEFFICIENT =,F10.5)            VS  7322
   44 FORMAT(/5X,33HTHE FUSELAGE MOMENT COEFFICIENT =,F10.5)          VS  7323
      RETURN                                                          VS  7324
      END                                                             VS  7325
C      FORTRAN NLSTIN                                                 VS  7326
      SUBROUTINE CENTRD(NS,NSUR,NW,IWING,CB,HALFB,ALP,YLE,YN,SWEEP,CS  VS  7327
     1,ALPBD,LPN,BETA,AM,KB,YCMX,MX,MSTP,YBR,BREAK,YA,MVRTX,M1,NC,IAGVX,VS  7328
     2SJ,WIDTH,ICAM,GAS,ABD,NASYM,IV,NLEF,YD2,KF)                     VS  7329
C      TO CALCULATE VORTEX BREAKDOWN ALPHAS                           VS  7330
      COMMON /INOUT/ INPT,JPT                                         VS  7331
      DIMENSION BREAK(6,1),YA(1),MVRTX(1),M1(6,1),NC(1)               VS  7332
      DIMENSION LPN(1),YCMX(6,2),MX(1),MSTP(1),YBR(6,2)               VS  7333
      DIMENSION YN(200,2),CS(1),YLE(1),A(30),NW(6,1),C(50),T(50)      VS  7334
      DIMENSION SWEEP(1),NS(1),ALPBD(6,2),IWING(1),HALFB(1)           VS  7335
      DIMENSION SJ(6,31,5),WIDTH(6,5),SK(30),ICAM(1),GAS(1),GK(2,2)   VS  7336
      DIMENSION ABD(6,1),SL(30),IV(1),NLEF(1),YD2(6,1)                VS  7337
      PI=3.14159265                                                   VS  7338
      SN2=SIN(ALP)**2                                                 VS  7339
      GB=SIN(BETA)                                                    VS  7340
      GB2=GB*GB                                                       VS  7341
      BK=BETA                                                         VS  7342
      NK=0                                                            VS  7343
      N=1                                                             VS  7344
      WRITE(JPT,68)                                                   VS  7345
   68 FORMAT(/5X,32HVORTEX-BREAKDOWN CHARACTERISTICS)                 VS  7346
      DO 5 K=1,NSUR                                                   VS  7347
      IG=1                                                            VS  7348
      IF(MVRTX(K).NE.0) IG=2                                          VS  7349
      IPP=BREAK(K,IG+5)                                               VS  7350
      IE=IG
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      IF(K.EQ.1) NK=NK+MVRTX(K)                                          VS  7351

      IF(K.GT.1.AND.MVRTX(K).NE.0) NK=NK+MVRTX(K)-NS(K-1)                VS  7352
      IP=0                                                               VS  7353
      IF(K.GT.1) IP=NS(K-1)                                              VS  7354
      M=NS(K)                                                            VS  7355
      IF(K.GT.1) M=NS(K)-NS(K-1)                                         VS  7356
      IF(IWING(K).NE.0.AND.K.EC.1) M=IWING(K)                            VS  7357
      IF(IWING(K).NE.0.AND.K.GT.1) M=M+NS(K)+IWING(K)                    VS  7358
      M2=0                                                               VS  7359
      IR=M                                                               VS  7360
      IF(K.EQ.1) IP=M-MVRTX(K)                                           VS  7361
      IF(K.GT.1.AND.MVRTX(K).NE.0) IP=M-MVRTX(K)+NS(K-1)                 VS  7362
      IF(NC(K).EQ.1) GO TO 4                                             VS  7363
      IF(NC(K).EQ.2 .AND. MVRTX(K).NE.0) GO TO 4                         VS  7364
      IF(IPP.EQ.1) GO TO 1                                               VS  7365
      K2 = M - 1                                                         VS  7366
      DO 6 I=1,K2                                                        VS  7367
      M2=M2+1                                                            VS  7368
      KH=I+NK                                                            VS  7369
      IF(ABS(SWEEP(KH)-SWEEP(KH+1)).GT.0.1) GO TO 7                      VS  7370
    6 CONTINUE                                                           VS  7371
    4 CONTINUE                                                           VS  7372
      MSTP(K)=0                                                          VS  7373
      M=IR                                                               VS  7374
      MX(K)=1                                                            VS  7375
      HREF=HALFB(K)-BREAK(K,IG)                                          VS  7376
      YREF=BREAK(K,IG)                                                   VS  7377
      YA(K)=BREAK(K,IG)                                                  VS  7378
      GO TO 8                                                            VS  7379
    1 M2=M1(K,IG)-1                                                      VS  7380
      KH=NK+M2                                                           VS  7381
    7 MX(K)=2                                                            VS  7382
      M=M2                                                               VS  7383
      MSTP(K)=KH+1                                                       VS  7384
      IE=1                                                               VS  7385
   11 CONTINUE                                                           VS  7386
      IF(YLE(KH).GT.BREAK(K,IE).AND.YLE(KH).LT.BREAK(K,IE+1)) GO TO 13   VS  7387
      IE=IE+1                                                            VS  7388
      GO TO 11                                                           VS  7389
   13 HREF=BREAK(K,IE+1)-BREAK(K,IG)                                     VS  7390
      YREF=BREAK(K,IG)                                                   VS  7391
      YA(K)=BREAK(K,IE+1)                                                VS  7392
      IF(NASYM.EQ.0) GO TO 8                                             VS  7393
      IF(YREF.LT.0.) YREF=BREAK(K,IE+1)                                  VS  7394
      IF(YA(K).LT.0.) YA(K)=-BREAK(K,IG)                                 VS  7395
      IF(YA(K).LT.0.) YA(K)=-BREAK(K,IF)                                 VS  7396
    8 CONTINUE                                                           VS  7397
      MI=MVRTX(K)                                                        VS  7398
      IF(K.GT.1.AND.MVRTX(K).NE.0) MI=MVRTX(K)-NS(K-1)                   VS  7399
      NI=N+MI*NW(K,1)                                                    VS  7400
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      IF(NASYM.EQ.1) NI=(M-1)*NW(K,1)-MI*NW(K,1)+N                      VS  7401
      N=NI                                                              VS  7402
      WRITE(JPT,3) N,NK,IR                                              VS  7403
C     IF(KB.EQ.0) YD2(K,1)=IE                                           VS  7404
      MII=MI                                                            VS  7405
      IXY=1                                                             VS  7406
      ICHK=0                                                            VS  7407
      IF(ICAM(K).NE.0.OR.NLEF(K).EQ.1) ICHK=1                           VS  7408
      IF(ICHK.EQ.1) IXY=2                                               VS  7409
      IF (KB .NE. 0) IXY=1                                              VS  7410
      IE=IG                                                             VS  7411
      KHH=KH                                                            VS  7412
      MN=M                                                              VS  7413
      NKK=NK                                                            VS  7414
      IEE=IE                                                            VS  7415
      YREF=YREF                                                         VS  7416
      HREF=HREF                                                         VS  7417
      DO 21 KJ=1,IXY                                                    VS  7418
      IF (KJ .EQ. 1) NX=N                                               VS  7419
      IF (KJ .EQ. 2) N=NX                                               VS  7420
      IF(KJ.EQ.1) GO TO 33                                              VS  7421
      NK=NKK                                                            VS  7422
      IE=IEE                                                            VS  7423
      KH=KHH                                                            VS  7424
      M=MN                                                              VS  7425
      MI=MII                                                            VS  7426
      YREF=YREF                                                         VS  7427
      HREF=HREF                                                         VS  7428
   33 CONTINUE                                                          VS  7429
      WRITE(JPT,60) K                                                   VS  7430
   60 FORMAT(/2X,21H***FOR SURFACE NUMBER, I3,2X,3H***)                 VS  7431
      IF(KJ.EQ.1.AND.IXY.EQ.2) WRITE(JPT,67)                            VS  7432
      IF(KJ.EQ.1.AND.IXY.EQ.1) WRITE(JPT,66)                            VS  7433
      IF(KJ.EQ.2.AND.IXY.EQ.2) WRITE(JPT,66)                            VS  7434
   67 FORMAT(/,5X,19H(FOR CAMBERED WING))                               VS  7435
   66 FORMAT(/,5X,22H(FOR NONCAMBERED WING))                            VS  7436
      K2 = MX(K)                                                        VS  7437
      DO 9 ID=1,K2                                                      VS  7438
      IF(ID.EQ.2) M=IR-M2                                               VS  7439
      IF(ID.EQ.2) MI=M2+MI                                              VS  7440
      IF(ID.EQ.2) YREF=HREF+YREF                                        VS  7441
      IF(ID.EQ.2) HREF=HALFB(K)-YREF                                    VS  7442
      IF(NASYM.EQ.1.AND.ID.EQ.2) YREF=0.                                VS  7443
      IF(NASYM.EQ.1.AND.ID.EQ.2) HREF=HALFB(K)                          VS  7444
      IF(IV(K).EQ.1) GO TO 90                                           VS  7445
      IF(KB.NE.0) GO TO 17                                              VS  7446
C     WRITE(JPT,3) M2,KH,M,MI,NK,IE,MX(K)                               VS  7447
C     WRITE(JPT,2) YREF,HREF                                            VS  7448
    3 FORMAT(8(6X,I4))                                                  VS  7449
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      IF(ID.EQ.1) YYF=YREF                                              VS  7450
      DO 10 I=1,M                                                       VS  7451
      II=I+NK                                                           VS  7452
      IF(YLE(II).LT.0.) II=M-II+1                                       VS  7453
      TT=1.-(ABS(YLE(II))-YREF)*2./HREF                                 VS  7454
      T(I)=ACOS(TT)                                                     VS  7455
      SL(I)=SIN(T(I))                                                   VS  7456
      SK(I)=SL(I)                                                       VS  7457
      Y=YLE(II)                                                         VS  7458
C     WRITE(6,100) II,Y,SK(I),TT,SL(I)                                  VS  7459
  100 FORMAT(6X,I4,4F10.5)                                              VS  7460
      AS=CS(II)                                                         VS  7461
      IF (KJ .EQ. 2) AS=GAS(II)                                         VS  7462
   10 C(I)=AS*SK(I)/(CB*SN2)                                            VS  7463
C     WRITE(JPT,2)(C(I),I=1,M)                                          VS  7464
      T(M+1)=PI                                                         VS  7465
      DO 15 I=1,M                                                       VS  7466
      KC=IE+ID-1                                                        VS  7467
      NCOL=M1(K,KC)                                                     VS  7468
      KLL=0                                                             VS  7469
      A(I)=0.                                                           VS  7470
      DO 16 J=1,M                                                       VS  7471
      IF(J.LT.NCOL) GO TO 24                                            VS  7472
      KLL=NCOL-1                                                        VS  7473
      KC=KC+1                                                           VS  7474
      NCOL=NCOL+M1(K,KC)-1                                              VS  7475
   24 KL=J-KLL                                                          VS  7476
      IF(NASYM.EQ.1.AND.ID.EQ.1) KL=M-(J-KLL)+1                         VS  7477
      FM=M1(K,KC)                                                       VS  7478
      JJ=J                                                              VS  7479
      IF(NASYM.EQ.1.AND.ID.EQ.1) JJ=M-J+1                               VS  7480
      TG=T(JJ)                                                          VS  7481
      AC=WIDTH(K,KC)/HREF*C(JJ)/SL(JJ)*SJ(K,KL,KC)*COS((I-1.)*TG)/FM    VS  7482
   16 A(I)=A(I)+AC                                                      VS  7483
   15 IF(I.NE.1)A(I)=2.*A(I)                                            VS  7484
      IE=KC                                                             VS  7485
      IF(ID.EQ.2.AND.KB.EQ.0) YC2(K,2)=KC                               VS  7486
      DO 20 I=1,M                                                       VS  7487
      C(I)=A(1)                                                         VS  7488
      K3 = M - 1                                                        VS  7489
      DO 23 IJ=1,K3                                                     VS  7490
   23 C(I)=C(I)+A(IJ+1)*COS(IJ*T(I))                                    VS  7491
   20 C(I)=C(I)/SK(I)                                                   VS  7492
      II=1+IP+MI                                                        VS  7493
      IK=IP+M+MI                                                        VS  7494
C     WRITE(JPT,2) (CS(I),I=II,IK)                                      VS  7495
C     WRITE(JPT,2) (C(I),I=1,M)                                         VS  7496
    2 FORMAT (8F10.5)                                                   VS  7497
      IPK=0.                                                            VS  7498
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      ICN=0                                                              VS  7499
      DO 14 I=2,M                                                        VS  7500
      IF(I.GT.2.AND.C(I).LT.C(I-1)) ICN=0                                VS  7501
      IF(C(I).GT.C(I-1)) ICN=ICN+1                                       VS  7502
      IF(I.EQ.2.AND.C(I).LT.C(I-1)) ICN=ICN+1                            VS  7503
      IF(ICN.EQ.1) GO TO 19                                              VS  7504
      IF(C(I).GT.C(I-1)) GO TO 14                                        VS  7505
      ICN=0                                                              VS  7506
      GO TO 14                                                           VS  7507
   19 IPK=IPK+1                                                          VS  7508
   14 CONTINUE                                                           VS  7509
      IF(NC(K).EQ.1) IPK=1                                               VS  7510
C     WRITE(JPT,3) IPK                                                   VS  7511
      IN=1                                                               VS  7512
      IL=1                                                               VS  7513
      ICN=0                                                              VS  7514
      DO 12 I=2,M                                                        VS  7515
      IF(C(I).LT.C(I-1)) ICN=ICN+1                                       VS  7516
      IF(ICN.EQ.1) IL=IL+1                                               VS  7517
      IF(C(I).GE.C(I-1)) IN=IN+1                                         VS  7518
      IF(C(I).LT.C(I-1).AND.IL.LE.IPK) IN=IN+1                           VS  7519
      IF(C(I).GE.C(I-1)) ICN=0                                           VS  7520
   12 CONTINUE                                                           VS  7521
      IF(IN.EQ.1) IN=2                                                   VS  7522
      TI=T(IN-1)                                                         VS  7523
      TIC=2.*(T(IN+1)-T(IN-1))/M                                         VS  7524
      CMAX=C(IN-1)                                                       VS  7525
      TT=TI                                                              VS  7526
C     WRITE(JPT,2) TI,TIC,CMAX                                           VS  7527
      DO 55 I=1,M                                                        VS  7528
      TI=TI+TIC                                                          VS  7529
      D=A(1)                                                             VS  7530
      K3 = M - 1                                                         VS  7531
      DO 56 IJ=1,K3                                                      VS  7532
   56 D=D+A(IJ+1)*COS(IJ*TI)                                             VS  7533
      D=D/SIN(TI)                                                        VS  7534
      IF(D.LT.CMAX) GO TO 60                                             VS  7535
      CMAX=D                                                             VS  7536
   55 TT=TI                                                              VS  7537
   60 YY=0.5*(1.-COS(TT))                                                VS  7538
      GC=A(1)*TT                                                         VS  7539
      GM=A(1)*(TT-SIN(TT))-A(2)*0.5*(TT-0.5*SIN(2.*TT))                  VS  7540
      K3 = M - 1                                                         VS  7541
      DO 65 L=1,K3                                                       VS  7542
      ST=SIN(L*TT)/L                                                     VS  7543
      GC=GC+A(L+1)*ST                                                    VS  7544
      GM=GM+A(L+1)*ST                                                    VS  7545
      IF(L.NE.1) GM=GM-0.5*A(L+1)*(SIN((L-1.)*TT)/(L-1.)+SIN((L+1.)*TT)  VS  7546
     1/(L+1.))                                                           VS  7547
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                                                                      VS  7548
 65 CONTINUE                                                          VS  7549
    GC=0.5*GC                                                         VS  7550
    GM=GM*0.25                                                        VS  7551
    YBAR=GM/GC                                                        VS  7552
    GK(KJ,ID)=GC                                                      VS  7553
    YBR(K,ID)=YBAR                                                    VS  7554
    WRITE(JPT,70) YBAR                                                VS  7555
 70 FORMAT (/2X,38HCENTROID TO MAX. SUCTION FORCE, YBAR =,F10.5)      VS  7556
    WRITE(JPT,72) GC                                                  VS  7557
 72 FORMAT (/2X,50HTOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)=,VS  7558
   1F10.5)                                                            VS  7559
    GO TO 18                                                          VS  7560
 17 YBAR=YBR(K,ID)                                                    VS  7561
 18 CONTINUE                                                          VS  7562
    YBARL=0.                                                          VS  7563
    BA=0.                                                             VS  7564
    BC=0.                                                             VS  7565
    ICC=0                                                             VS  7566
    DO 40 I=1,M                                                       VS  7567
    KH=I+NK                                                           VS  7568
    IF(NASYM.EQ.1.AND.ID.EQ.1) KH=M-KH+1                              VS  7569
    IF(KB.EQ.0.AND.I.EQ.1) FST=COS(SWEEP(KH))                         VS  7570
    SWO=SWEEP(KH)                                                     VS  7571
    IF(NASYM.EQ.1.AND.ID.EQ.1) GO TO 31                               VS  7572
    IF(KB.EQ.1.AND.I.EQ.1) FST=COS(SWEEP(KH)-BK)                      VS  7573
    IF(KB.EQ.2.AND.I.EQ.1) FST=COS(SWEEP(KH)+BK)                      VS  7574
    GO TO 32                                                          VS  7575
 31 SWO=-SWO                                                          VS  7576
    IF(KB.EQ.1.AND.I.EQ.1) FST=COS(SWO+BK)                            VS  7577
 32 CONTINUE                                                          VS  7578
    IF(KB.EQ.0) GO TO 81                                              VS  7579
    FSS=COS(SWEEP(KH))                                                VS  7580
    FT=0.                                                             VS  7581
    IF(FSS.GT.0.001) FT=SIN(SWO)/FSS                                  VS  7582
    SN=1.                                                             VS  7583
    IF(KB.EQ.2) SN=-1.                                                VS  7584
    BA=BA+1.+2.*GB*SN+FT*GB2                                          VS  7585
    BC=BC+1.                                                          VS  7586
 81 CONTINUE                                                          VS  7587
    YY1=YN(N,1)                                                       VS  7588
    YY2=YN(N,2)                                                       VS  7589
    IF(NASYM.EQ.1.AND.ID.EQ.1)YY1=ABS(YN(N,2))                        VS  7590
    IF(NASYM.EQ.1.AND.ID.EQ.1) YY2=ABS(YN(N,1))                       VS  7591
C   WRITE(JPT,3) N,KH,M,NK                                            VS  7592
    RY1=(YY1-YREF)/HREF                                               VS  7593
    IF(RY1.GT.YBAR) GO TO 45                                          VS  7594
    RY2=(YY2-YREF)/HREF                                               VS  7595
    IF(KB.EQ.0) SWP=SWO                                               VS  7596
    IF(KB.EQ.1) SWP=SWO-BK
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      KZ=0                                                                  VS  7597
      IF(NASYM.EQ.1.AND.ID.EQ.1) KZ=1                                       VS  7598
      IF(KZ.EQ.1.AND.KB.EQ.1) SWP=SWQ+BK                                    VS  7599
      IF(KB.EQ.2) SWP=SWEEP(KH)+BK                                          VS  7600
      IF(ABS(SWP-PI/2.).LT.0.001.OR.SWP.GT.PI/2.) GO TO 43                  VS  7601
      FS=COS(SWP)                                                           VS  7602
      IF(RY1.LT.YBAR.AND.RY2.GT.YBAR) GO TO 42                              VS  7603
      DY=(YY2-YY1)/FS                                                       VS  7604
      YBARL=YBARL+DY/HREF                                                   VS  7605
      NI=N+NW(K,1)                                                          VS  7606
      IF(NASYM.EQ.1.AND.ID.EQ.1) NI=N-NW(K,1)                               VS  7607
      N=NI                                                                  VS  7608
      ICC=ICC+1                                                             VS  7609
   40 CONTINUE                                                              VS  7610
   42 DY=(YBAR-(YY1-YREF)/HREF)/FS                                          VS  7611
      YBARL=YBARL+DY                                                        VS  7612
      GO TO 45                                                              VS  7613
   43 YBARL=10.                                                             VS  7614
   45 CONTINUE                                                              VS  7615
      IF(IAGVX.NE.0.AND.ID.EQ.2) GO TO 46                                   VS  7616
      IF(KF.EQ.1.AND.ID.EQ.1) GO TO 48                                      VS  7617
      GO TO 47                                                              VS  7618
   46 HH=HALFB(K)                                                           VS  7619
      YBARL=YBARL*HREF/HH+(YREF-YYF)/(HH*FST)                               VS  7620
      GO TO 47                                                              VS  7621
   48 HH=HREF+YREF                                                          VS  7622
      IF(KB.EQ.2.OR.KB.EQ.0) YBARL=YBARL*HREF/HH+YREF/(HH*FST)              VS  7623
   47 CONTINUE                                                              VS  7624
      N=N+NW(K,1)*(M-ICC)                                                   VS  7625
      IF(NASYM.EQ.1.AND.ID.EQ.1) N=M*NW(K,1)+1                              VS  7626
      IF(ICC.LT.M) KH=KH+M-ICC-1                                            VS  7627
      IF(NASYM.EQ.1.AND.ID.EQ.1) KH=M                                       VS  7628
      NK=KH                                                                 VS  7629
      WRITE (JPT,71) YBARL                                                  VS  7630
   71 FORMAT (/2X,38HL.E. LENGTH OF MAX. SUCTION CENTROID =,F10.5)          VS  7631
      IF (KJ .EQ. 1 .AND. IXY .EQ. 2) GO TO 9                               VS  7632
      Y=YBARL                                                               VS  7633
      YCMX(K,ID)=Y                                                          VS  7634
      IF(Y.LT.2.5) ALPBD(K,ID)=9.195-Y*(23.734-Y*(60.81-Y*(33.533-          VS  7635
     1 Y*(7.391-0.581*Y))))                                                 VS  7636
      IF(Y.GE.2.5) ALPBD(K,ID)=38.                                          VS  7637
      IF(KB.EQ.0) GO TO 82                                                  VS  7638
      BA=SQRT(BA/BC)                                                        VS  7639
      DA=SIN(ALPBD(K,ID)*PI/180.)                                           VS  7640
      DA=DA/BA                                                              VS  7641
      ALPBD(K,ID)=ATAN(DA/SQRT(1.-DA*DA))*180./PI                           VS  7642
   82 CONTINUE                                                              VS  7643
      WRITE(JPT,75) ALPBD(K,ID)                                             VS  7644
      IF(KB.EQ.0) WRITE(JPT,76)                                             VS  7645
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      IF(KB.EQ.1) WRITE(JPT,77)                                                 VS  7646
      IF(KB.EQ.2) WRITE(JPT,78)                                                 VS  7647
   76 FORMAT(5X,52H(WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING))VS  7648
   77 FORMAT(5X,55H(WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIVS  7649
     1P))                                                                       VS  7650
   78 FORMAT(5X,54H(WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIPVS  7651
     1))                                                                        VS  7652
   75 FORMAT (/2X,36HALPHA FOR VORTEX BREAKDOWN AT T.E. =,F10.5,2X,4HDEGVS  7653
     1.)                                                                        VS  7654
      ALPBD(K,ID)=ALPBD(K,ID)*PI/180.                                           VS  7655
      GO TO 9                                                                   VS  7656
   90 ALPBD(K,ID)=0.5*PI                                                        VS  7657
      YCMX(K,ID)=10.                                                            VS  7658
    9 CONTINUE                                                                  VS  7659
   21 CONTINUE                                                                  VS  7660
      IF(IV(K).EQ.1) GO TO 22                                                   VS  7661
      IF(ICHK.EQ.1) GO TO 26                                                    VS  7662
      IF (IXY .EQ. 1) GO TO 22                                                  VS  7663
   26 CONTINUE                                                                  VS  7664
      K2 = MX(K)                                                                VS  7665
      DO 25 ID=1,K2                                                             VS  7666
      IF (KB .NE. 0) GO TO 27                                                   VS  7667
      GG=GK(1,ID)/GK(2,ID)                                                      VS  7668
      SA=SIN(ALP)*SQRT(GG)                                                      VS  7669
      SB=1.-SA*SA                                                               VS  7670
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      PA=ALP                                                                VS  7671
      IF (SB .GT. 0.) PA=ACOS(SQRT(SB))                                     VS  7672
      PB=ALP-PA                                                             VS  7673
      ALPBD(K,ID)=ALPBD(K,ID)+PB                                            VS  7674
      IF (KB .EQ. 0) ABD(K,ID)=PB                                           VS  7675
      GO TO 25                                                              VS  7676
   27 ALPBD(K,ID)=ALPBD(K,ID)+ABD(K,ID)                                     VS  7677
   25 CONTINUE                                                              VS  7678
   22 CONTINUE                                                              VS  7679
      IF(IWING(K).NE.0) NK=NK+NS(K)-IWING(K)                                VS  7680
      IF(NW(K,2).EQ.0) GO TO 80                                             VS  7681
      IF(K.EQ.1) NK=NK+NS(K)                                                VS  7682
      IF(K.GT.1) NK=NK+NS(K)-NS(K-1)                                        VS  7683
   80 CONTINUE                                                              VS  7684
C     WRITE(JPT,3) NK,KH                                                    VS  7685
    5 N=LPN(K)+1                                                            VS  7686
      RETURN                                                                VS  7687
      END                                                                   VS  7688
C      FORTRAN NLSTIN                                                       VS  7689
      FUNCTION FRATN(Y)                                                     VS  7690
C       DETERMINING THE FRACTION OF REMAINING VORTEX LIFT                   VS  7691
      IF(Y.LT.1.49) FRATN=0.131+0.384*Y                                     VS  7692
      IF(Y.GE.1.49.AND.Y.LT.3.72) FRATN=0.951-0.208*Y+0.028*Y*Y             VS  7693
      IF(Y.GE.3.72) FRATN=0.5                                               VS  7694
      RETURN                                                                VS  7695
      END                                                                   VS  7696
C      FORTRAN NLSTIN                                                       VS  7697
      FUNCTION REDBD(DX)                                                    VS  7698
C       DETERMINING THE DECREASE IN ALPHA(BDTE) IN THE SITUATION WITH       VS  7699
C        AUGMENTED VORTEX LIFT                                              VS  7700
      COMMON /INOUT/ INPT,JPT                                               VS  7701
      K=1                                                                   VS  7702
      IF(DX.GE.0.72) GO TO 1                                                VS  7703
      IF(DX.GE.0.6) DA=6.                                                   VS  7704
      IF(DX.GE.0.45.AND.DX.LT.0.6) DA=3.                                    VS  7705
      IF(DX.LT.0.45) DA=1.                                                  VS  7706
    2 CONTINUE                                                              VS  7707
      DF=0.45697446-0.32302748*DA+0.09099042*DA*DA-0.01087976*DA**3         VS  7708
     1 +0.0004601*DA**4                                                     VS  7709
      FA=DA*(0.45697446-DA*(0.16151374-DA*(0.03033014-DA*(0.00271994        VS  7710
     1 -DA*0.00009202)))) -DX                                               VS  7711
      DB=DA-FA/DF                                                           VS  7712
      IF(ABS(DB-DA).LT.0.001) GO TO 5                                       VS  7713
      DA=DB                                                                 VS  7714
      K=K+1                                                                 VS  7715
      IF(K.EQ.11) GO TO 5                                                   VS  7716
      GO TO 2                                                               VS  7717
    1 DB=8.+(DX-0.72)/0.0226                                                VS  7718
    5 REDBD=DB                                                              VS  7719
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C       WRITE(JPT,3) K,DB                                                       VS  7720
      3 FORMAT (3X,3HK =,I4,2X,11HDELTA ALP =,F10.5)                            VS  7721
        RETURN                                                                  VS  7722
        END                                                                     VS  7723
C        FORTRAN NLSTIN                                                         VS  7724
        FUNCTION BDPT(ALPDT)                                                    VS  7725
C         DETERMINING THE LOCATION OF VORTEX-BREAKDOWN POINT ON THE WING        VS  7726
        IF(ALPDT.GE.8.) GO TO 1                                                 VS  7727
        BDPT=ALPDT*(0.45697446-ALPDT*(0.16151374-ALPDT*(0.03033014              VS  7728
       1-ALPDT*(0.00271994-ALPDT*0.00009202))))                                 VS  7729
        GO TO 5                                                                 VS  7730
      1 BDPT=0.72+0.0226*(ALPDT-8.)                                             VS  7731
      5 RETURN                                                                  VS  7732
        END                                                                     VS  7733
C        FORTRAN NLSTIN                                                         VS  7734
        SUBROUTINE BENDIN(NC,CL,BM,IWING,BREAK,CBMR,CBTR,NWING,HALFSH,HALFVS  7735
       1BH,DC,DS,IWGLT,FL,NASYM,NNC,KRL,NSUR,NS)                                VS  7736
C        TO CALCULATE BENDING MOMENT DISTRIBUTION ON LIFTING SURFACES           VS  7737
        DIMENSION A(30),BM(6,1),H(30),PHI(30),BREAK(6,1),CL(1)                  VS  7738
        DIMENSION DC(6,1),DS(6,1),IWING(1),NWING(1),HALFBH(1),IWGLT(1)          VS  7739
        DIMENSION NC(1),NS(1),CBMR(1),CBTR(1),FL(1)                             VS  7740
        COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  7741
       1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  7742
       200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  7743
        COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  7744
       1NFP(6),NW(6,2)                                                          VS  7745
        COMMON /INOUT/ INPT,JPT                                                 VS  7746
        PI=3.14159265                                                           VS  7747
        KQ=0                                                                    VS  7748
        KD=0                                                                    VS  7749
        DO 12 L=1,NSUR                                                          VS  7750
        KQT=0                                                                   VS  7751
        KA=NS(L)                                                                VS  7752
        IF(L.GT.1) KA=KA-NS(L-1)                                                VS  7753
        NST=KA-M1(L,NC(L))+1                                                    VS  7754
        IF(NASYM.EQ.1 .AND. KRL.EQ.2) NST=0                                     VS  7755
        NKC=NC(L)-NNC                                                           VS  7756
        NI=0                                                                    VS  7757
        IF(NASYM.EQ.1 .AND. KRL.EQ.0) NI=1                                      VS  7758
        SUMF=0.                                                                 VS  7759
        SUMM=0.                                                                 VS  7760
        SUMS=0.                                                                 VS  7761
        FTL=0.                                                                  VS  7762
        AREA=HALFSW                                                             VS  7763
        HAB=HALFB(L)                                                            VS  7764
        IF (IWGLT(L).EQ.1) HAB=HALFB(L)                                         VS  7765
        IF (IWGLT(L).EQ.2) AREA=HALFSW                                          VS  7766
        IF (IWGLT(L).EQ.2) HAB=HALFB(L)                                         VS  7767
        K2 = NC(L)                                                              VS  7768
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      DO 1 I=1,K2                                                        VS  7769
      M=NC(L)-I+1                                                        VS  7770
      IP=0                                                               VS  7771
      IF(NI.EQ.1 .AND. I.GT.NNC) GO TO 6                                 VS  7772
      IF(NASYM.EQ.1 .AND. KRL.EQ.2) GO TO 6                              VS  7773
      IF(I.EQ.NNC) GO TO 8                                               VS  7774
      IF (I.NE.NC(L)) DIHEFC=DC(L,M)*DC(L,M-1)+DS(L,M)*DS(L,M-1)         VS  7775
      IF(I.NE.NC(L)) DIHEFS=DS(L,M)*DC(L,M-1)-DC(L,M)*DS(L,M-1)          VS  7776
      IF (I.EQ.NC(L)) GO TO 8                                            VS  7777
      GO TO 7                                                            VS  7778
    6 AREA=HALFSW                                                        VS  7779
      HAB=HALFB(L)                                                       VS  7780
      M=I                                                                VS  7781
      IP=1                                                               VS  7782
      IF(KRL.EQ.0) M=I-NNC                                               VS  7783
      IF(KRL.EQ.0 .AND. M.EQ.NKC) GO TO 8                                VS  7784
      IF(KRL.NE.0 .AND. I.EQ.NNC) GO TO 8                                VS  7785
      DIHEFC=DC(L,M)*DC(L,M+1)+DS(L,M)*DS(L,M+1)                         VS  7786
      DIHEFS=DS(L,M)*DC(L,M+1)-DC(L,M)*DS(L,M+1)                         VS  7787
      GO TO 7                                                            VS  7788
    8 DIHEFC=1.                                                          VS  7789
      DIHEFS=0.                                                          VS  7790
    7 CONTINUE                                                           VS  7791
      WSPAN=WIDTH(L,M)*0.5                                               VS  7792
      MM=M1(L,M)-1                                                       VS  7793
      MM1=M1(L,M)                                                        VS  7794
      FM=MM1                                                             VS  7795
      IF (M.EQ.NWING(L)) AREA=HALFSW                                     VS  7796
      IF (M.EQ.NWING(L)) HAB=HALFB(L)                                    VS  7797
      IF(NASYM.EQ.0) GO TO 18                                            VS  7798
      IF(KRL.EQ.0) GO TO 18                                              VS  7799
      IF(I.GT.NNC) GO TO 19                                              VS  7800
   18 CONTINUE                                                           VS  7801
      DO 2 J=1,MM                                                        VS  7802
      FJ=J                                                               VS  7803
      JJ=NST+J+KD                                                        VS  7804
      KM=NST+J+KO                                                        VS  7805
      IF(NW(L,2).EQ.0) GO TO 40                                          VS  7806
      IF(L.EQ.1) II=KM+NS(L)                                             VS  7807
      IF(L.GT.1) II=KM+NS(L)-NS(L-1)                                     VS  7808
      CHORD=CH(KM)+CH(II)                                                VS  7809
      GO TO 41                                                           VS  7810
   40 CHORD=CH(KM)                                                       VS  7811
   41 CONTINUE                                                           VS  7812
C     WRITE(JPT,100) NST,KD,KM,II,JJ                                     VS  7813
      PHI(J)=FJ*PI/FM                                                    VS  7814
      H(J)=CL(JJ)*CHORD*SJ(L,J,M)                                        VS  7815
    2 CONTINUE                                                           VS  7816
      DO 3 J=1,MM1                                                       VS  7817
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                                                                      VS  7818
      A(J)=0.                                                         VS  7819
      FJ=J                                                            VS  7820
      DO 4 K=1,MM                                                     VS  7821
    4 A(J)=A(J)+H(K)*COS((FJ-1.)*PHI(K))                              VS  7822
      IF (J .EQ. 1) A(J)=A(J)/FM                                      VS  7823
      IF (J .NE. 1) A(J)=A(J)*2./FM                                   VS  7824
    3 CONTINUE                                                        VS  7825
   19 CONTINUE                                                        VS  7826
      DO 10 K=1,MM1                                                   VS  7827
      JK=MM1-K                                                        VS  7828
      IF(NASYM.EQ.1 .AND. KRL.EQ.2) JK=K                              VS  7829
      IF(NI.EQ.1 .AND. I.GT.NNC) JK=K                                 VS  7830
      KK=JK+NST                                                       VS  7831
      KL=KK+KO                                                        VS  7832
C     WRITE(JPT,100) KK,KL,KO,JK                                      VS  7833
  100 FORMAT (5(6X,I4))                                               VS  7834
      IF(NASYM.EQ.0) GO TO 25                                         VS  7835
      IF(KRL.EQ.0) GO TO 25                                           VS  7836
      IF(I.GT.NNC) GO TO 26                                           VS  7837
   25 CONTINUE                                                        VS  7838
      IF(K.EQ.MM1) GO TO 15                                           VS  7839
      BSPAN=BREAK(L,M)-YLE(KL)+WSPAN                                  VS  7840
      SNAM=0.                                                         VS  7841
      IF(IP.EQ.1) SNAM=(A(1)*BSPAN-0.5*A(2)*WSPAN)*PI*WSPAN/(2.*AREA*HABVS  7842
     1)                                                               VS  7843
      SUM=A(1)*((PI-PHI(JK))*BSPAN+SIN(PHI(JK))*WSPAN)-0.5*A(2)*WSPAN*( VS  7844
     1PI-PHI(JK)-SIN(2.*PHI(JK))/2.)-A(2)*SIN(PHI(JK))*BSPAN          VS  7845
      DO 11 J=2,MM                                                    VS  7846
      FJ=J                                                            VS  7847
   11 SUM=SUM-BSPAN*A(J+1)*SIN(FJ*PHI(JK))/FJ+WSPAN*0.5*A(J+1)*(SIN((FJ+VS  7848
     11.)*PHI(JK))/(FJ+1.)+SIN((FJ-1.)*PHI(JK))/(FJ-1.))             VS  7849
      BM(L,KK)=WSPAN*SUM/(2.*AREA*HAB)+SUMM+SUMF*(BREAK(L,(M+1-IP))-YLE(VS  7850
     1KL))*(-1.)**IP-SNAM                                             VS  7851
      GO TO 10                                                        VS  7852
   15 BSPAN=WSPAN                                                     VS  7853
      IF(IP.EQ.1) BSPAN=-WSPAN                                        VS  7854
      SUM=(A(1)*BSPAN-0.5*A(2)*WSPAN)*PI                              VS  7855
      IF(IP.EQ.1) SUM=-SUM                                            VS  7856
      SUMM=WSPAN*SUM/(2.*AREA*HAB)+SUMM+SUMF*(BREAK(L,M+1)-BREAK(L,M)) VS  7857
      GO TO 10

                                                                      VS  7858
   26 BM(L,KK)=0.                                                     VS  7859
   10 CONTINUE                                                        VS  7860
      KOT=KOT+MM1-1                                                   VS  7861
C     WRITE(JPT,50) (A(K),K=1,MM1)                                    VS  7862
C     WRITE(JPT,50) WSPAN,SUM,AREA,HAB,SUMM,SUMF                      VS  7863
      IF(NASYM.EQ.0) GO TO 27                                         VS  7864
      IF(KRL.EQ.0) GO TO 27                                           VS  7865
      IF(I.GT.NNC) GO TO 29                                           VS  7866
   27 CONTINUE
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      P1=A(1)*PI*WSPAN/(2.*AREA*HAB)                                    VS  7867
      SUMF=(SUMF+P1)*DIHEFC-SUMS*DIHEFS                                 VS  7868
      SUMS=(SUMF+P1)*DIHEFS+SUMS*DIHEFC                                 VS  7869
   29 CONTINUE                                                          VS  7870
      IF (M.EQ.(NWING(L)+1).AND.IWING(L).NE.0) GO TO 16                 VS  7871
      GO TO 17                                                          VS  7872
   16 SUMT=SUMM                                                         VS  7873
      FTL=SUMF                                                          VS  7874
      IF (IWGLT(L).EQ.1) GO TO 17                                       VS  7875
      SUMM=0.                                                           VS  7876
      SUMF=0.                                                           VS  7877
      SUMS=0.                                                           VS  7878
   17 CONTINUE                                                          VS  7879
      IF(NI.EQ.1 .AND. I.EQ.NNC) GO TO 30                               VS  7880
      IF (I.EQ.NC(L)) GO TO 20                                          VS  7881
      IF(NASYM.EQ.1 .AND. KRL.EQ.2) GO TO 28                            VS  7882
      IF(NI.EQ.1 .AND. I.GT.NNC) GO TO 28                               VS  7883
      NST=NST-M1(L,M-1)+1                                               VS  7884
      GO TO 1                                                           VS  7885
   28 NST=NST+M1(L,M)-1                                                 VS  7886
      GO TO 1                                                           VS  7887
   20 NST=0                                                             VS  7888
      GO TO 1                                                           VS  7889
   30 SUMT=SUMM                                                         VS  7890
      FTL=SUMF                                                          VS  7891
      SUMM=0.                                                           VS  7892
      SUMF=0.                                                           VS  7893
      SUMS=0.                                                           VS  7894
      NST=0                                                             VS  7895
    1 CONTINUE                                                          VS  7896
      CBMR(L)=SUMM                                                      VS  7897
      CBTR(L)=SUMT                                                      VS  7898
      FL(L)=FTL                                                         VS  7899
      KQ=KQT+KQ                                                         VS  7900
      KD=KD+KQT                                                         VS  7901
      IF(NW(L,2).NE.0 .AND. L.EQ.1) KQ=KQ+NS(L)                         VS  7902
      IF(NW(L,2).NE.0 .AND. L.GT.1) KQ=KQ+NS(L)-NS(L-1)                 VS  7903
   12 CONTINUE                                                          VS  7904
   50 FORMAT (5F10.5)                                                   VS  7905
   51 FORMAT (5(6X,I4))                                                 VS  7906
      RETURN                                                            VS  7907
      END                                                               VS  7908
C      FORTRAN NLSTIN                                                   VS  7909
      SUBROUTINE BACKWH (X,Y,Z,LPANEL,B,LPAN1,NW,GAMMA,VX,LAT,CD,SD,YK, VS  7910
     1DC,DS,VT,IWING,ZB,YB,YBB,NCS,IWGLT,IV,NC1,KF,BREAK)               VS  7911
C      TO CALCULATE BACKWASH DUE TO IMAGE VORTICES IN GROUND EFFECT     VS  7912
      DIMENSION NW(6,1),GAMMA(1),U(2),YK(6,1),DC(6,1),DS(6,1)           VS  7913
     1,LPAN1(1),IWING(1),IV(1),IWGLT(1),BREAK(6,1)                      VS  7914
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  7915
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     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS   7916
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS   7917
      COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,HEIGHT,  VS   7918
     1ATT,NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6)             VS   7919
                                                                         VS   7920
      B1=B                                                               VS   7921
      IZ=1                                                               VS   7922
      IFF=1                                                              VS   7923
      IPN=1                                                              VS   7924
      IW=1                                                               VS   7925
      NASYM=YCON(50)                                                     VS   7926
      ZA=0.                                                              VS   7927
      YA=BREAK(1,1)                                                      VS   7928
      YAA=BREAK(1,1)                                                     VS   7929
      IF(NASYM.EQ.0) GO TO 30                                            VS   7930
      YA=YK(1,NC1)                                                       VS   7931
      YAA=YA                                                             VS   7932
      IF(NC1.EQ.1) GO TO 30                                              VS   7933
      NC11=NC1-1                                                         VS   7934
      DO 31 J=1,NC11                                                     VS   7935
      ZA=ZA+(YK(1,J)-YK(1,J+1))*DS(1,J+1)                                VS   7936
   31 YAA=YAA+(YK(1,J)-YK(1,J+1))*DC(1,J+1)                              VS   7937
      YA=YK(1,1)                                                         VS   7938
   30 CONTINUE                                                           VS   7939
      YAP=YA                                                             VS   7940
      YAAP=YAA                                                           VS   7941
      MM=NW(1,1)                                                         VS   7942
      L=1                                                                VS   7943
      IP=1                                                               VS   7944
      VX=0.                                                              VS   7945
      VT=0.                                                              VS   7946
      DO 10 J=1,LPANEL                                                   VS   7947
      ISN=1                                                              VS   7948
      NN=NW(L,1)                                                         VS   7949
      COSD=DC(L,IPN)                                                     VS   7950
      SIND=DS(L,IPN)                                                     VS   7951
      JJ=J                                                               VS   7952
      MI=J-IFF+1                                                         VS   7953
      IF (J.GT.LPAN1(L).AND.J.LE.LPN(L)) ISN=2                           VS   7954
      IF(J.GT.LPAN1(L).AND.J.LE.LPN(L)) NN=NW(L,2)                       VS   7955
      FN=NN                                                              VS   7956
      NK=NN                                                              VS   7957
      IF(J.GE.LPAN1(L).AND.J.LT.LPN(L)) NK=NW(L,2)                       VS   7958
      IF(J.EQ.LPN(L).AND.J.LT.LPANEL) NK=NW(L+1,1)                       VS   7959
      X1=XN(J,1)-X                                                       VS   7960
      X2=XN(J,2)-X                                                       VS   7961
      X12=XN(J,2)-XN(J,1)                                                VS   7962
      Y12=YN(J,2)-YN(J,1)                                                VS   7963
      Z12=ZN(J,2)-ZN(J,1)+Y12*SIND                                       VS   7964
      Y12=Y12*COSD
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      Z1=ZN(J,1)-(Z+ZB+(Y-YB)*SD)+ZA+(YN(J,1)-YA)*SIND                  VS  7965
      Z2=ZN(J,2)-(Z+ZB+(Y-YB)*SD)+ZA+(YN(J,2)-YA)*SIND                  VS  7966
      XZJ=X1*Z12-Z1*X12                                                 VS  7967
      ISM=2                                                             VS  7968
      IF (IV(L).EQ.1) ISM=1                                             VS  7969
      IF(NASYM.EQ.1) ISM=1                                              VS  7970
      DO 16 II=1,ISM                                                    VS  7971
      FCP=1.                                                            VS  7972
      IF (II .EQ. 2) FCP=-1.                                            VS  7973
      YC=FCP*(YBB+(Y-YB)*CD)                                            VS  7974
      Y1=YAA+(YN(J,1)-YA)*COSD-YC                                       VS  7975
      Y2=YAA+(YN(J,2)-YA)*COSD-YC                                       VS  7976
      XYK=X1*Y12-Y1*X12                                                 VS  7977
      YZI=Y1*Z12-Z1*Y12                                                 VS  7978
      ALB1=XYK*XYK+XZJ*XZJ+B1*YZI*YZI                                   VS  7979
      R1B1=SQRT(X1*X1+B1*Y1*Y1+B1*Z1*Z1)                                VS  7980
      R2B1=SQRT(X2*X2+B1*Y2*Y2+B1*Z2*Z2)                                VS  7981
      UUB1=(X2*X12+B1*Y2*Y12+B1*Z2*Z12)/R2B1-(X1*X12+B1*Y1*Y12+B1*Z1*Z12VS  7982
     1)/R1B1                                                            VS  7983
      G1=(1.-X1/R1B1)/(Y1*Y1+Z1*Z1)                                     VS  7984
      G2=(1.-X2/R2B1)/(Y2*Y2+Z2*Z2)                                     VS  7985
      IF(LAT.NE.0.AND.IV(L).EQ.0) GO TO 14                              VS  7986
      IF(KF.EQ.0) GO TO 14                                              VS  7987
      IF(IP.NE.1) GO TO 14                                              VS  7988
      G1=0.                                                             VS  7989
   14 CONTINUE                                                          VS  7990
      F1=UUB1*XYK/ALB1                                                  VS  7991
      F2=-Y2*G2+Y1*G1                                                   VS  7992
      F4=-XZJ*UUB1/ALB1                                                 VS  7993
      F5=Z2*G2-Z1*G1                                                    VS  7994
      F12=-(F1+F2)                                                      VS  7995
      F45=F4+F5                                                         VS  7996
      IF (LAT .EQ. 0) F45=F45*FCP                                       VS  7997
      IF (LAT .NE. 0) F12=F12*FCP                                       VS  7998
      F3=UUB1*YZI/ALB1                                                  VS  7999
      IF (LAT .NE. 0) F3=F3*FCP                                         VS  8000
      U(II)=F3*CH(IZ)*SN(L,MI,ISN)*GAMMA(JJ)/(8.*PN)                    VS  8001
      VT=VT+(F12*SD+F45*CD)*CH(IZ)*SN(L,MI,ISN)*GAMMA(JJ)/(8.*PN)       VS  8002
   16 CONTINUE                                                          VS  8003
      VX=U(1)+U(2)+VX                                                   VS  8004
      IF(J.LT.MM) GO TO 6                                               VS  8005
      IF(J.EQ.LPANEL) GO TO 10                                          VS  8006
      IZ=IZ+1                                                           VS  8007
      IW=IW+1                                                           VS  8008
      IFF=MM+1                                                          VS  8009
      MM=MM+NK                                                          VS  8010
      IF (IWING(L).NE.0.AND.IW.EQ.(IWING(L)+1)) GO TO 17                VS  8011
      IF(J.EQ.LPAN1(L).OR.J.EQ.LPN(L)) GO TO 5                          VS  8012
      IF (YLE(IZ).LT.YK(L,IPN)) GO TO 6                                 VS  8013
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   17 CONTINUE                                                          VS  8014
      NJ=0                                                              VS  8015
      IF(NASYM.EQ.1.AND.IPN.LT.NC1) NJ=1                                VS  8016
      IF(NJ.EQ.1) IPN=IPN+1                                             VS  8017
      ZA=ZA+(YK(L,IPN)-YA)*DS(L,IPN)                                    VS  8018
      YAA=YAA+(YK(L,IPN)-YA)*DC(L,IPN)                                  VS  8019
      YA=YK(L,IPN)                                                      VS  8020
      IF (IWING(L).NE.0.AND.IW.EQ.(IWING(L)+1)) GO TO 20                VS  8021
      GO TO 21                                                          VS  8022
   20 IF (IWGLT(L).EQ.1) GO TO 21                                       VS  8023
    5 ZA=0.                                                             VS  8024
      YA=BREAK(L,1)                                                     VS  8025
      YAA=BREAK(L,1)                                                    VS  8026
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(L)) YA=YAP                           VS  8027
      IF(NASYM.EQ.1.AND.J.EQ.LPAN1(L)) YAA=YAAP                         VS  8028
      IF(J.EQ.LPN(L).AND.L.LT.6) YA=BREAK(L+1,1)                        VS  8029
      IF(J.EQ.LPN(L).AND.L.LT.6) YAA=BREAK(L+1,1)                       VS  8030
      IF(J.EQ.LPAN1(L).OR.J.EQ.LPN(L)) GO TO 21                         VS  8031
      IF (IWGLT(L).NE.2) GO TO 21                                       VS  8032
      ZA=YK(L,NC(L)-2)*DS(L,1)                                          VS  8033
      YAA=YK(L,NC(L)-2)*DC(L,1)                                         VS  8034
      YA=YK(L,NC(L)-2)                                                  VS  8035
   21 CONTINUE                                                          VS  8036
      IF(NJ.NE.1) IPN=IPN+1                                             VS  8037
      IF (J.EQ.LPAN1(L).OR.J.EQ.LPN(L)) IPN=1                           VS  8038
    6 CONTINUE                                                          VS  8039
      KH=0                                                              VS  8040
      IF(J.EQ.LPAN1(L).AND.J.NE.LPN(L)) KH=1                            VS  8041
      IF(KH.EQ.1.AND.L.EQ.1) IW=IW-NS(L)                                VS  8042
      IF(KH.EQ.1.AND.L.GT.1) IW=IW-NS(L)+NS(L-1)                        VS  8043
      IF(J.EQ.LPAN1(L)) IP=1                                            VS  8044
      IF(J.EQ.LPN(L)) IP=1                                              VS  8045
   10 IF (J.EQ.LPN(L)) L=L+1                                            VS  8046
      RETURN                                                            VS  8047
      END                                                               VS  8048
C      FORTRAN NLSTIN                                                   VS  8049
      SUBROUTINE DRAG (CLT,YBREAK,NC,TFLP,NAL)                          VS  8050
C     TO CALCULATE THE FAR-FIELD INDUCED DRAG                           VS  8051
      DIMENSION ALPHI(50),YBREAK(6,1),TFLP(6,1),XK(50),YK(50),NC        VS  8052
     1(1),NAL(1)                                                        VS  8053
      COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),VS  8054
     1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(6,15,2),XN(200,2),YN(2VS  8055
     200,2),ZN(200,2),WIDTH(6,5),YCON(51),SWEEP(100),HALFB(6),SJ(6,31,5)VS  8056
      COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)                    VS  8057
      COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),  VS  8058
     1NFP(6),NW(6,2)                                                    VS  8059
      COMMON /INOUT/ INPT,JPT                                           VS  8060
      M=41                                                              VS  8061
      PI=3.14159265                                                     VS  8062
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      NS=(M+1)/2-1                                                      VS  8063
      MM1=M-1                                                           VS  8064
      FM=M                                                              VS  8065
      DO 3 I=1,NS                                                       VS  8066
      FI=I                                                              VS  8067
      J=M-I                                                             VS  8068
      XK(I)=SIN(FI*PI/FM)                                               VS  8069
      XK(J)=XK(I)                                                       VS  8070
      YK(I)=-COS(FI*PI/FM)                                              VS  8071
    3 YK(J)=-YK(I)                                                      VS  8072
      DO 4 I=1,NCS                                                      VS  8073
    4 CM(I)=SQRT(1.-(YLE(I)/HALFB(1))**2)                               VS  8074
      IC=1                                                              VS  8075
      BREAK=YBREAK(1,1)                                                 VS  8076
      MST=1                                                             VS  8077
      MEND=M1(1,1)-1                                                    VS  8078
      DO 5 I=1,NS                                                       VS  8079
      YCON(I)=0.                                                        VS  8080
      CD(I)=0.                                                          VS  8081
      II=NS+I                                                           VS  8082
      BB=YK(II)*HALFB(1)                                                VS  8083
      IF (BB .LE. BREAK) GO TO 12                                       VS  8084
      NK=M1(1,IC)-1                                                     VS  8085
      IC=IC+1                                                           VS  8086
      NO=M1(1,IC)-1                                                     VS  8087
      BREAK=YBREAK(1,IC)                                                VS  8088
      MST=MST+NK                                                        VS  8089
      MEND=MEND+NO                                                      VS  8090
   12 CONTINUE                                                          VS  8091
      DO 6 J=MST,MEND                                                   VS  8092
      IF (NW(1,2).EQ.0) GO TO 60                                        VS  8093
      J1=J+NCS                                                          VS  8094
      CHORD=CH(J)+CH(J1)                                                VS  8095
      GO TO 61                                                          VS  8096
   60 CHORD=CH(J)                                                       VS  8097
   61 CONTINUE                                                          VS  8098
      A=1.                                                              VS  8099
      DO 7 K=MST,MEND                                                   VS  8100
      IF (K .EQ. J) GO TO 7                                             VS  8101
      A=A*(BB-YLE(K))/(YLE(J)-YLE(K))                                   VS  8102
    7 CONTINUE                                                          VS  8103
      CD(I)=CD(I)+A*CL(J)*CM(J)                                         VS  8104
    6 YCON(I)=YCON(I)+A*CHORD                                           VS  8105
      CD(I)=CD(I)/SQRT(1.-YK(II)**2)                                    VS  8106
    5 CONTINUE                                                          VS  8107
      DO 10 I=1,NS                                                      VS  8108
      ALPHI(I)=0.                                                       VS  8109
      IN=NS+I                                                           VS  8110
      DO 15 J=1,MM1                                                     VS  8111
```

```
      IF (J .EQ. IN) GO TO 20                                                  VS  8112
      INDEX=IABS(J-IN)                                                         VS  8113
      FACTOR=2.*((-1.)**INDEX-1.)*XK(J)/(FM*(YK(J)-YK(IN))**2)                 VS  8114
      GO TO 25                                                                 VS  8115
   20 FACTOR=FM/XK(J)                                                          VS  8116
   25 IF (J .GT. NS) GO TO 30                                                  VS  8117
      JJ=M-J-NS                                                                VS  8118
      GO TO 35                                                                 VS  8119
   30 JJ=J-NS                                                                  VS  8120
   35 ALPHI(I)=ALPHI(I)+CD(JJ)*YCON(JJ)*FACTOR                                 VS  8121
   15 CONTINUE                                                                 VS  8122
      ALPHI(I)=ALPHI(I)/(16.*HALFB(1))                                         VS  8123
   10 CONTINUE                                                                 VS  8124
      CDI=0.                                                                   VS  8125
      DO 40 I=1,NS                                                             VS  8126
      IN=NS+I                                                                  VS  8127
   40 CDI=CDI+CD(I)*YCON(I)*ALPHI(I)*XK(IN)                                    VS  8128
      CDI=CDI*HALFB(1)*PI/(HALFSW*FM)                                          VS  8129
      CDL2=CDI/(CLT*CLT)                                                       VS  8130
      WRITE (JPT,45) CDI                                                       VS  8131
      WRITE (JPT,50) CDL2                                                      VS  8132
   45 FORMAT (/2X,23HFAR-FIELD INDUCED DRAG=,F10.5)                            VS  8133
   50 FORMAT (/2X,33HFAR-FIELD INDUCED DRAG PARAMETER=,F10.5)                  VS  8134
      RETURN                                                                   VS  8135
      END                                                                      VS  8136
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15. Supplementary Notes

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16. Abstract

A computer program based on theQuasi-Vortex-Lattice Method of Lan is presented for calculating longitudinal and lateral-directional aerodynamic characteristics of nonplanar wing-body combination. The method is based on the assumption of inviscid subsonic flow. Both attached and vortex-separated flows are treated. For the vortex-separated flow, the calculation is based on the method of suction analogy. The effect of vortex breakdown is accounted for by an empirical method. A summary of the theoretical method, program capabilities, input format, output variables and program job control set-up are described. Three test cases are presented as guides for potential users of the code.

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