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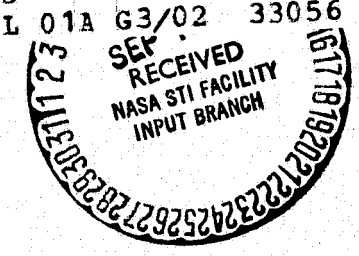
APPROXIMATE METHOD FOR CALCULATING TRANSONIC FLOW ABOUT LIFTING WING-BODY CONFIGURATIONS: COMPUTER PROGRAM AND USER'S MANUAL

Richard W. Barnwell and Ruby M. Davis

August 1975



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16. Abstract

This paper is a user's manual for a computer program which calculates inviscid flow about lifting configurations in the free-stream Mach-number range from zero to low supersonic. Angles of attack of the order of the configuration thickness-length ratio and less can be calculated. An approximate formulation is used which accounts for shock waves, leading-edge separation and wind-tunnel wall effects.

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Richard W. Barnwell and Ruby M. Davis

Langley Research Center

SUMMARY

This paper is a user's manual for a computer program which calculates inviscid flow about lifting configurations in the free-stream Mach number range from zero to low supersonic. Angles of attack of the order of the configuration thickness-length ratio and less can be treated. An approximate formulation is used which accounts for shock waves, leading edge separation and wind-tunnel wall effects.

INTRODUCTION

In this paper a listing, user's manual, and sample case for a computer program which calculates inviscid flow about lifting configurations traveling at any Mach number in the range from zero to low supersonic is presented. The angle-of-attack range extends to values of the order of the configuration thickness length ratio. The approximate method which is used is described in reference 1. A preliminary version of the method is described in reference 2. The theory of

references 3 and 4 is used to reduce the nonlinear three-dimensional problem of transonic flow about lifting configurations to two two-variable problems: a linear lift problem and a nonlinear coupled thickness-lift problem.

The linear lift solution is determined first. For free-stream Mach numbers near one this solution is obtained from slender-wing theory. For subsonic and supersonic Mach numbers appreciably different from one the theory of Lawrence and Flax (ref. 5) and a modified version of the quasi-conical theory of Carofoli (ref. 6), respectively, are used. It should be noted that the lift solution varies consistently in the transonic range because the theory of Lawrence and Flax and quasiconical theory both reduce to slender wing theory as the free-stream Mach number approaches one.

The nonlinear thickness-lift solution is determined numerically with a two-independent variable method of relaxation algorithm of the type introduced by Murman and Cole (ref. 7). The present method is similar to that of Bailey (ref. 8) for axisymmetric flow except that the shock finite-difference operator of Murman (ref. 9) is employed.

The two-variable formulation of the thickness-lift problem is similar to the axisymmetric formulation, in that the independent variables are the axial and radial coordinates x and r as shown in figure 1.

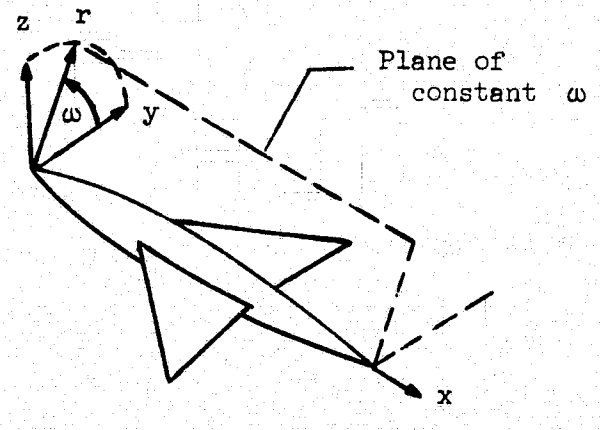


Figure 1.- Coordinate systems.

However, cross-flow effects are not set to zero as in axisymmetric flow but are evaluated with the theory of references 3 and 4. It should be noted that this theory accounts for nonlinear as well as linear phenomena. Solutions are determined in semiplanes of constant polar angle ω such as the one shown in figure 1. A separate solution must be obtained in each plane for which results are desired. Note that the angle ω is zero in the wing plane and is positive above the wing.

A discussion of the program input and output are given in this paper. In addition, a Fortran IV program listing is given in appendix A, and a sample input and output are given in appendices B and C, respectively. The minimum number of computer storage locations required to execute the program on the CDC 6600 computer is $77{,}000_8$.

SYMBOLS

a,b	width and spacing of slots in slotted tunnel wall
$f(x)$	dipole strength for linear lift solution
M_∞	free-stream Mach number
r	radial coordinate
U_∞	free stream velocity
u,v	perturbation velocity components in axial and radial directions
x	axial coordinate
x_c	axial position of maximum body diameter
y	spanwise coordinate
z	vertical coordinate
α	angle of attack
κ	constant of proportionality for slotted-wall boundary condition
ρ_∞	free-stream denisty
ω	polar angle

DESCRIPTION OF INPUT

The program input consists of 17 fixed-point and 22 floating-point parameters which are input with a namelist statement. These parameters are organized into several groups according to their use.

Computational Grid

The first 10 parameters determine the grid, which is shown schematically in figure 2. The grid indices in the axial and radial directions are J and K, respectively; and the arrays for the axial and radial grid coordinates are XW(J) and RW(K).

The grid in the axial direction is specified by the fixed-point parameters J1, J2, J3, J4 and J5 and the floating-point parameter FAC. The grid is uniform between J1 and J4. The body is located between J2 and J3, and the x grid is scaled such that

$$XW(J2) = 0,$$

$$XW(J3) = 1.$$

There are expanded grids in the regions J=1 to J=J1 and J=J4 to J=5 such that

$$(XW(J) - XW(J-1))/(XW(J+1) - XW(J)) = FAC$$

in the upstream nonuniform region and

$$(XW(J) - XW(J-1))/(XW(J-1) - XW(J-2)) = FAC$$

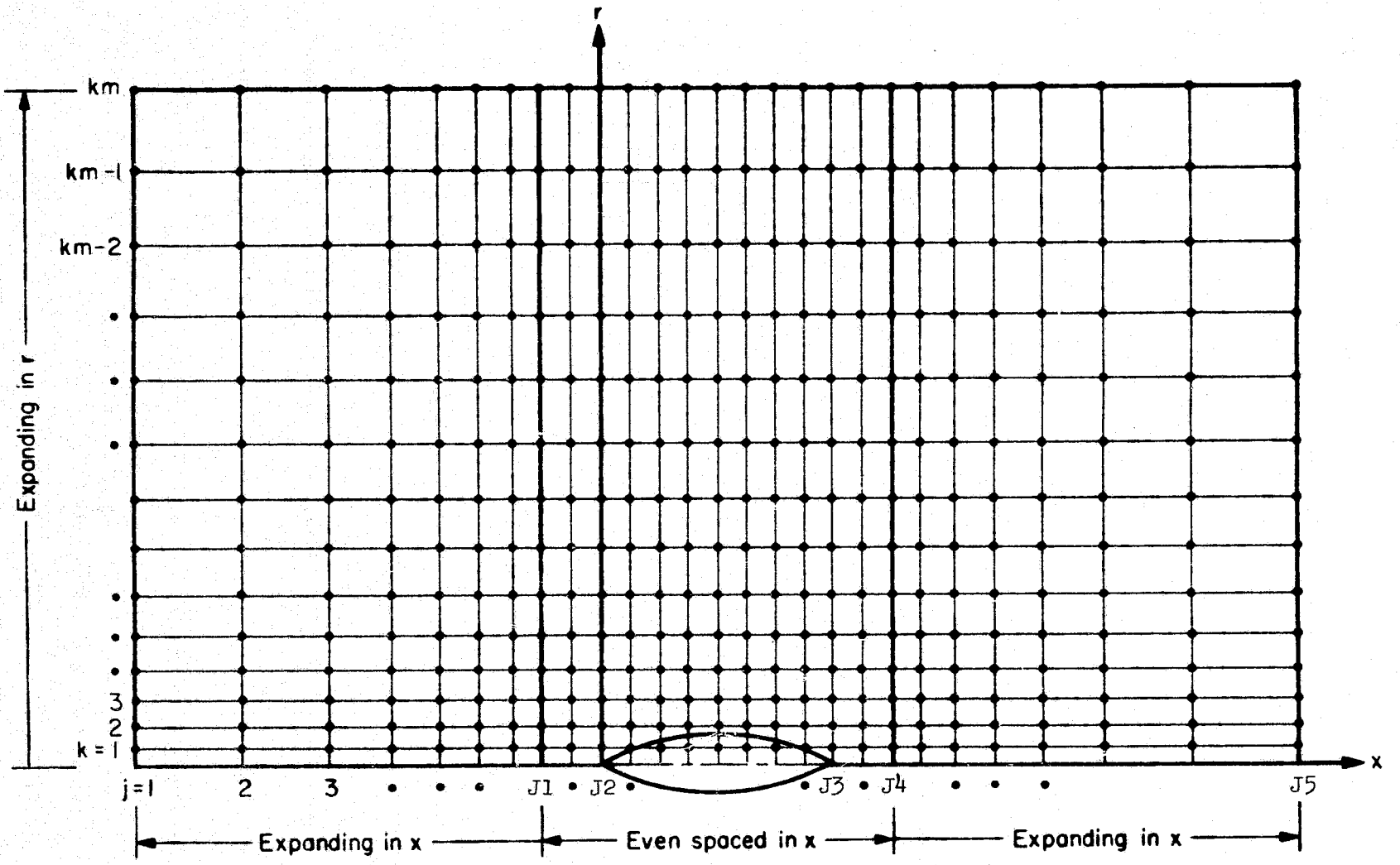


Figure 2.– Finite difference grid.

in the downstream nonuniform region. For supersonic free-stream Mach numbers it is recommended that the grid be uniform everywhere. This is accomplished by setting

$$J1 = 1$$

$$J4 = J5$$

The grid in the radial direction is specified by the fixed-point parameter KM and the floating-point parameters RCØM,A and B. The index of the outer boundary is KM. The radial grid distribution is given by the equation

$$RW(K) = RC\emptyset M + ETA/(B - ETA*A)$$

where

$$ETA = K/KM$$

The quantity RCØM is the radius at which the inner boundary condition is applied, and the parameters A and B determine that stretching in the radial direction. If A=B the radius of the outer boundary RW(KM) is infinite.

Outer Boundary Condition

The boundary condition at the outer wall is specified by the fixed-point parameter IWALL and the floating-point parameter P. The values for IWALL are

$$\text{IWALL} = \begin{cases} 0, \text{ free air} \\ 1, \text{ porous wall} \\ 2, \text{ slotted wall} \end{cases}$$

If IWALL=0, the parameter P is not used by the program so any value may be input. For a porous wall (IWALL = 1) P is the constant of proportionality in the porous-wall boundary condition

$$v = -Pu$$

where u and v are the perturbation velocity components in the axial and radial directions respectively. For a slotted wall (IWALL = 2) P is the constant of proportionality in the slotted wall boundary condition

$$\frac{\partial v}{\partial x} = -Pu$$

It should be noted that P for slotted walls is the reciprocal of the parameter κ used in references 1 and 2. Baldwin, Turner and Knechtel (ref. 10) derive the approximate form

$$\kappa = -\frac{b}{\pi} \ln \left(\sin \frac{\pi a}{2b}\right)$$

where b and a are the slot width and spacing.

Basic Parameters

There are five basic floating-point parameters. ØMEGAD is the polar angle ω shown in figure 1 which defines the plane in which the computation is made, and ALPHAD is the angle of attack. Both ØMEGAD and ALPHAD are in degrees. HSPAN is the nondimensional semispan of the wing. The Mach number and ratio of specific heats are specified by the parameters AMINF and GAMMA, respectively.

Body

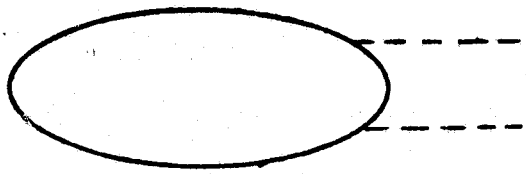
The body shape is specified by two fixed-point parameters and four floating-point parameters. There are 5 body shapes which can be used. The choice of body shape is designated with the parameter IR as shown in figure 3. The maximum body radius is specified by the parameter RMAX.

The parameters RC and RN are used only for the general pointed bodies. If IR is not 1 or 2 any value can be specified for these parameters. The general pointed-body shapes were developed by McDevitt and Taylor (ref. 11). If the point of maximum thickness is ahead of the mid-point the body radius R(J) is given by the FORTRAN IV equation

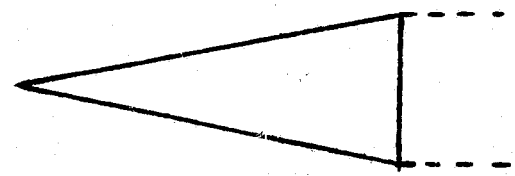
```
R(J) = RC*RMAX *(1. - XW(J) - (1. - XW(J)) **RN)
```

and if the point of maximum thickness is behind the midpoint the equation for the body radius is

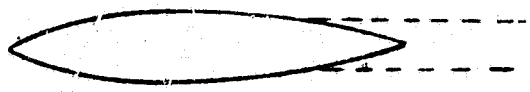
```
R(J) = RC *RMAX *(XW(J) - XW(J) **RN)
```



ellipse. IR = 0



cone, IR = 3



general pointed body, maximum radius ahead of midpoint
IR = 1

ogive-cylinder-ogive,
IR = 4

general pointed body, maximum radius behind midpoint
IR = 2

Figure 3.- Body shapes.

Values for RC, RN and IR for several configurations are given in table I. The values in this table were obtained from reference 11. Let the axial

Location of maximum radius, x	IR	RC	RN
.3	1	1.71	6.03
.4	1	2.36	3.39
.5	1 or 2	4.00	2.00
.6	2	2.36	3.39
.7	2	1.71	6.03

Table I. - Parameters for general pointed body.

location of the maximum radius be designated as x_c. In general x_c, RC and RN are related as

$$x_c = 1 - \left(\frac{1}{RN}\right)^{\frac{1}{RN-1}}$$

$$RC = \frac{1}{1 - x_c - (1-x_c)^{RN}}$$

for $x_c \leq 1/2$ and as

$$x_c = \left(\frac{1}{RN}\right)^{\frac{1}{RN-1}}$$

$$RC = \frac{1}{x_c - x_c^{RN}}$$

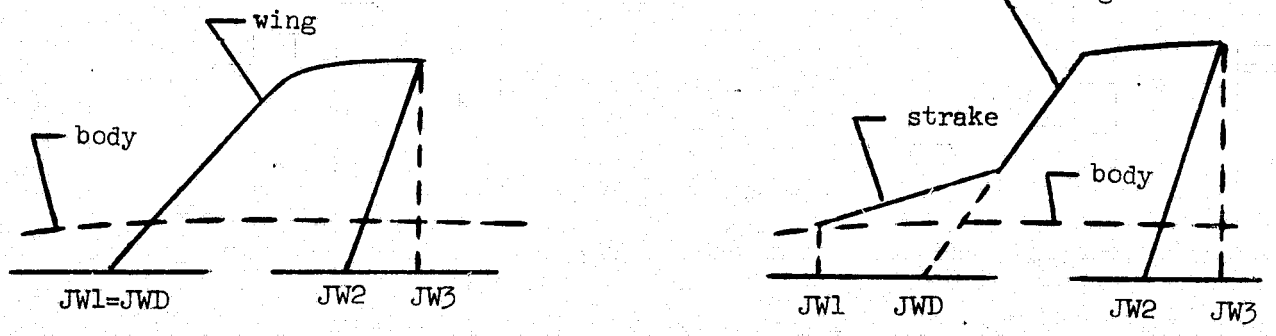
for $x_c \geq 1/2$

The configurations which can be treated can have stings. The radius of the sting is specified by the parameter RS, and the axial location where the sting starts has the axial index JS. The sting extends to J3. If there is to be no sting, let RS = 0, and JS = J3.

The lengths of the ogive sections of the ogive-cylinder-ogive are each one quarter of the body length.

Wing

The wing shape, type of flow at the leading edge and algorithm for solving the linear-lift problem are specified with 6 fixed-point parameters and 4 floating-point parameters. The identities of the parameters JW1, JW2, JW3 and JWD are indicated in figure 4 for wings with and without strakes.



(a) Wing without strake

(b) Wing with strake

Figure 4.- Fixed-point wing parameters.

The leading and trailing edges of the wing are specified by the arrays Y2(J) and Y1(J), respectively. In this report the trailing edge is a straight line. It may be swept or unswept. An upswept trailing edge is specified by setting JW2 = JW3. Two types of leading-edge shape are considered. Both types satisfy the condition that the tangent to the wing at the trailing edge is parallel to the free-stream direction so that the slender-wing solution satisfies the Kutta condition automatically.

The first leading-edge shape, which is depicted in figure 5, is a portion of a hyperbola. The foci of the hyperbola lie on the line with the

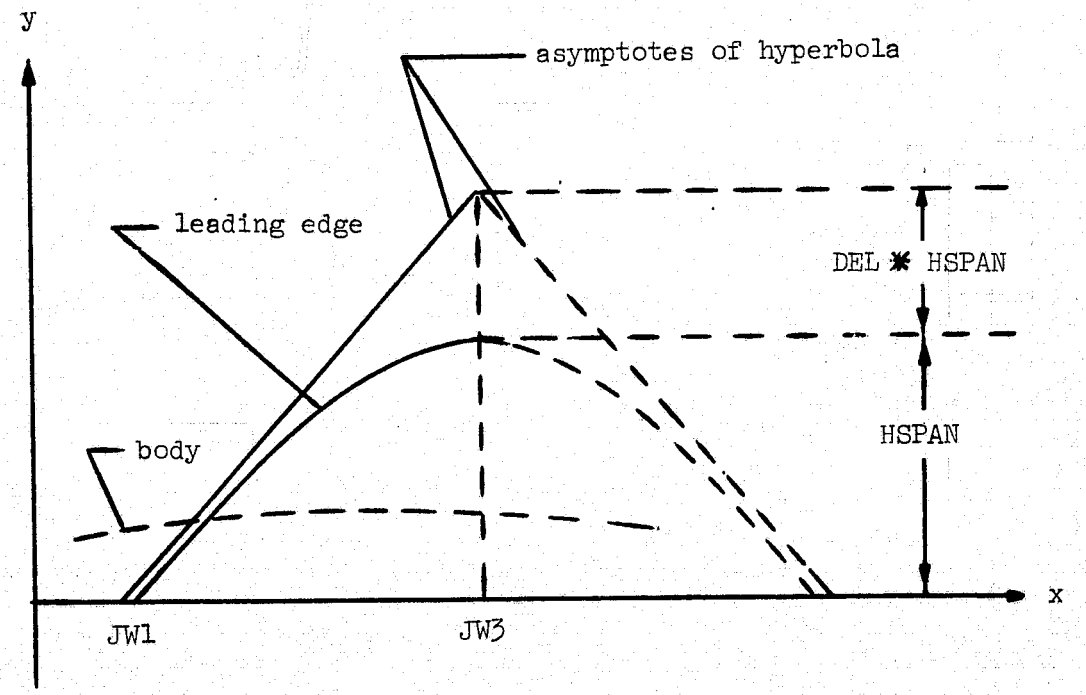


Figure 5.- First leading-edge shape.

index JW3. The wing shape is specified with the parameter IWING. The specification for the first leading-edge shape is IWING = 0. The only floating-point parameter which must be specified for this leading-edge shape is DEL. This parameter and HSPAN are depicted in figure 5.

The second leading edge shape is depicted in figure 6. This shape is

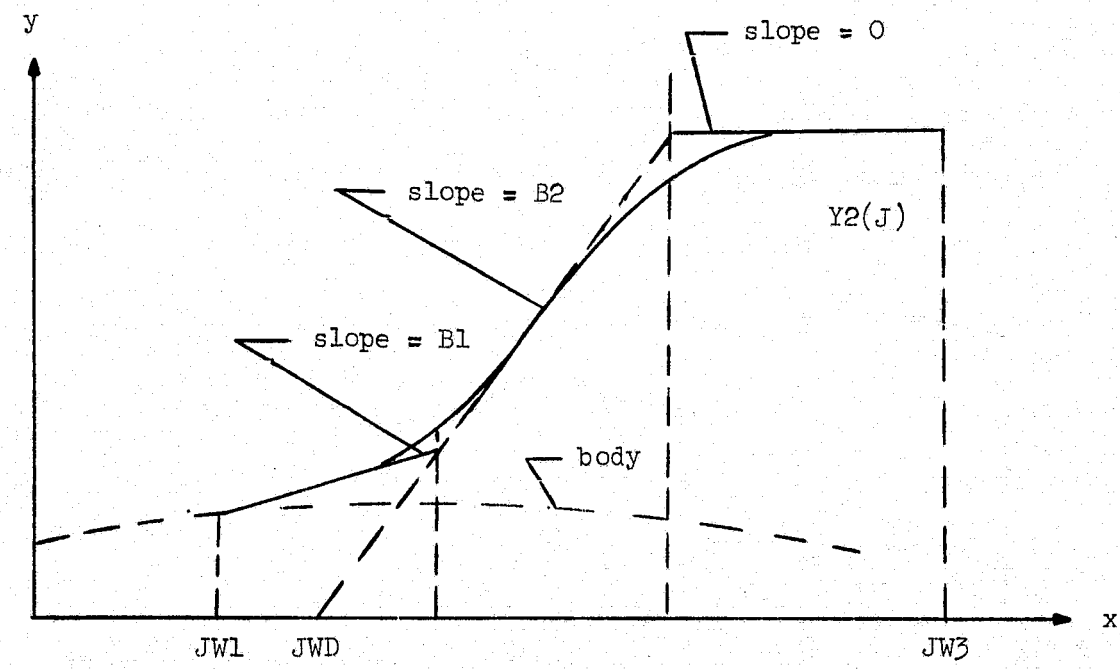


Figure 6.- Second leading-edge shape.

composed of two or three straight-line segments and one or two fillets. The specification for a wing without a strake is IWING = 1 or IWING = -1. The parameter is positive if the linear lift solution is to be determined with slender wing theory and negative if quasi-conical theory or the theory of Lawrence and Flax is to be used. This wing is composed of two segments with the slopes B2 and 0 as indicated in figure 6. The parameter DEL gives

the fractional difference in the local wingspan at the junction point with and without the fillet. The equation for this fractional difference is

$$DEL = (HSPAN - Y2)/HSPAN$$

For a wing without a strake any values will suffice for the parameters B1 and DEL1 since they are not used. The specification for a wing with a strake is IWING = 2 or IWING = -2. This wing is composed of 3 segments with the slopes B1, B2 and 0 as shown in figure 6. The definition of the parameter DEL is the same as for a wing without a strake. The parameter DEL1 has a similar definition. Let the y coordinate of the intersection point of the first two segments (the segments with the slopes B1 and B2) be designated as YI. The equation for DEL1 is

$$DEL1 = (Y2 - YI)/YI$$

There are three options as to how the flow at the leading edge of the wing behaves. These options are designated with the parameter IVØR. If the flow is attached the parameter has the value IVØR = 0, and if the flow is separated at the leading edge the parameter has the value IVØR = 1. If the wing has a strake, the flow can be separated at the leading edge of the strake and attached on the wing. For this type of flow the parameter has the value IVØR = 2.

Computational Parameters

There are two fixed-point and three floating-point parameters which are used to control the computation. As discussed in references 1 and 2, different approximations are used at points inside the wingtip and beyond the wingtip. In order to make the transition the outer region is divided into a thin inner strip and a broad outer strip. There are some differences in the way the problem is formulated in the two strips of the outer region. However, the solution is virtually independent of the relative widths of the two strips. The width of the inner strip is specified by the parameter IDIR. This parameter generally has been given the value 4 by the authors.

The convergence of the program is defined in terms of the maximum change in the velocity potential from one cycle to the next at all the grid points. The computation is terminated when the absolute value of the maximum change from one iteration cycle to the next at any grid location is less than the parameter EPSI. Also, the computation will be terminated if the number of iterations reaches IMAX.

The method of successive line overrelaxation is used in this program. The relaxation factor which is used at points where the flow is subsonic is input with the parameter SUB. This factor can be no larger than 2. At points where the flow is supersonic the relaxation factor is 1 unless the flow at the point immediately upstream is subsonic. If this circumstance pertains, the relaxation factor should be less than one. The value for this factor is input with the parameter SUP. Typically, this factor is given a value slightly less than 1.

Plotting Parameter

The program output includes two or three figures. The first figure is a view of the configuration in the plane of constant ω (see figure 1) and any shock waves or sonic lines which may be present. The second and third figures are plots of pressure distributions. The scale factor for plotting the first figure is input with the parameter SFACTOR. The number which is input is the number of unit lengths per inch which are to be used.

DESCRIPTION OF PRINTED OUTPUT

The computational program is divided into 3 main parts called Program Start, Program Work, and Program Result. All three parts have output.

Program Start

The function of Program Start is to establish the basic working constants and arrays used to make the numerical computation. All of these constants and arrays are printed at the end of Program Start. As mentioned previously, the axial and radial grid point locations are given by the arrays XW(J) and RW(K). The shape of the body and the leading and trailing edges of the wing are given by the arrays R(J), Y2(J) and Y1(J), respectively, and the axial derivative of the cross-sectional area is given by the array SPRIME(J). The axial indices of the first columns of grid points downstream of the points where the wing leading and trailing edges emerge from the body are designated as JW1Ø and JW2Ø. In references 1 and 2, the dipole strength for the linear lift solution is designated by the function f(x). In the program the dipole strength and the axial derivative of the dipole strength are given by the arrays FUN3(J) and FUN2(J) respectively.

The Brown and Michael model for leading-edge separation is used. This model represents the vortex system at the leading edge with a vortex core and vorticity feeding sheet. In this program the y and z locations of the vortex core are given by the arrays YV(JG) and ZV(JG) where the position index JG is related to the axial index J by the equation

$$JG = J - JW1\emptyset + 3$$

The vortex-core strength and the axial derivative of the strength are designated as GAN and DGANDX, respectively. As noted in the previous section, the flow is separated along the entire length of the leading edge if the separation input parameter is IVØR = 1. If the separation input parameter has the value IVØR = 2 and the wing has a strake (IWING = 2 or IWING = -2) the flow is separated at the leading edge only along the strake. Aft of the strake the vortex trails across the wing and the flow is attached at the leading edge of the wing. The last axial station at which the flow at the leading edge is separated is designated by the parameter JCHCK.

Program Work

After each iteration cycle is completed, the largest change in the velocity potential and the grid location where this change is located are printed. The axial and radial indices are designated as JMARK and KMARK, respectively, and the change in velocity potential is designated as DPHIMX. As mentioned previously separate computations are made at points above and beneath the wing if the computational plane is the horizontal plane ($\omega = 0°$). If the position indices are negative the maximum change in velocity potential has occurred beneath the wing.

Program Result

The computed results are printed in this part of the program. First the shock wave and sonic line locations at each axial station in the region of uniform axial grid ($J2 \leq J \leq J3$) are printed. Provision is made for a total of as many as 6 shock waves and sonic lines at each axial station.

The next quantities to be printed are the pressure coefficients at all the grid points in the region of uniform axial grid. These are printed in rows from K=1 to K=KF where KF = KM if a wall is present and Kl = KM-1 for free air. In general, the pressure coefficients are calculated with the approximate form of the linear lift potential used in Program Work. The pressure coefficient on both sides of the wing is printed if the flow is calculated on both sides of the wing. In addition, the pressure coefficients at points on the wing are calculated with a more accurate form of the linear lift potential.

The computed values of the potential for the coupled thickness-lift problem are printed next. If the flow beneath the wing is calculated, the potential beneath the wing is printed.

The distribution of the lift along the axis of the configuration is printed. In addition, vortex effects and thickness interaction effects are given. These quantities have been made nondimensional with the product $\rho_\infty U_\infty^2$ where ρ_∞ and U_∞ are the free-stream density and speed. The lift, moment, moment arm about the nose and the lift and moment coefficients are also printed.

The pressure coefficient distribution on the body surface is determined and printed. If the configuration is at zero angle of attack so that the flow is axisymmetric only one distribution is given. If the configuration is at

angle of attack and the computational plane is the wing-plane ($\omega = 0°$) the distributions along the intersections of the body surface with the wing plane ($\omega = 0°$) and the vertical plane ($\omega = +90°, -90°$), are given. Two distributions are given along the intersection of the body surface and wing plane, one for the pressure coefficient above the wing and one for the coefficient beneath the wing. The distributions which are obtained for the intersection of the body surface and vertical plane from the horizontal-plane calculation are simply surmised from the horizontal-plane results with the aid of slender-body and slender-wing theory. If the computational plane is the vertical plane ($\omega = 90°$ or $\omega = -90°$), only the distribution of the pressure coefficient along the intersection of the body surface and the computational plane is printed. When leading-edge vortices and strake-generated vortices are included, the pressure distributions both with and without vortex effects are printed. It should be noted that the body-surface pressure coefficients for lifting configurations are complete only if the computational plane is the horizontal plane ($\omega = 0°$) or the vertical plane ($\omega = 90°$ or $\omega = -90°$). Lift effects are not included for other values of ω.

A number called DRAG is calculated and printed. This number is determined by integrating the surface pressure distribution. The accuracy of the present program is not good enough for this procedure to yield a meaningful value for the drag. It is not unusual for the sign of the number to be negative.

DESCRIPTION OF PLOTTED OUTPUT

The output includes either 2 or 3 plots, the first of which shows a view of the configuration and the shock-wave and sonic-line structure in the computational plane, and the second and third of which depict axial pressure-

coefficient distributions. If the configuration is at zero angle of attack only one distribution, the body-surface distribution is plotted. Four distributions are given on two plots if the configuration is lifting and the computational plane is the wing plane ($\omega = 0°$). These distributions are for the pressure coefficient along the intersection of the body surface and the wing plane above and beneath the wing and along the intersection of the body surface and the vertical plane ($\omega = -90°$). If the configuration is lifting and the computational plane is the vertical plane ($\omega = 90°$ or $\omega = 90°$) the distribution along the intersection of body surface and the side of the vertical plane which is being computed is given.

ARRAY SIZE

There are eight CØMMØN statements. The first of these is for scalar quantities derived in the program and the last is for the input parameters. These second and third CØMMØN statements are for one-dimensional arrays in the axial direction and are dimensioned 120 in the listing given in appendix A. The fourth statement is for one-dimensional arrays in the radial direction which are dimensioned 100 in appendix A. If the grid size in the axial or radial direction is to exceed 120 or 100, respectively, the dimension of the corresponding arrays must be changed. The fifth and sixth statements are for the one-dimensional arrays in the radial and axial directions respectively, which are used to make computations under the wing of lifting configurations. These arrays are used only if the angle of attack is not zero and the computational plane is the wing plane ($\omega = 0°$). The dimension of the axial arrays must be at least as large as the number JW3-JW1Ø + 4 where JW3 and JW1Ø are the axial indices for the rear-most tip of the wing and the grid point either at or just downstream of the point where the leading edge of the wing intersects the body surface, respectively. It should be noted that JW3 is an input parameter, and JW1Ø is determined by the program. The dimension of the radial arrays must be at least as large as the index of the smallest value of the array RW(K) which is larger than the input parameter HSPAN. The dimensions of these radial and axial arrays in the listing in appendix A are 25 and 50 respectively. The two-dimensional arrays PHI(J,K) and PHIU(JG,K) for the general velocity potential and the velocity potential under the wing, respectively, are dimensioned in the seventh CØMMØN block. In the listing given in appendix A the axial and radial dimensions are

109 and 50, respectively, for the former array and 50 and 25, respectively, for the latter array. The seventh CØMMØN, statement also contains the array for the coefficients used in the series solution for the linear lift obtained with Lawrence-Flax theory.

APPENDIX A

PROGRAM LISTING

The computational program is listed in this appendix. It is written in the Fortran IV computer language and contains two primary overlays. The numerical computation and the printing is done in the first primary overlay, which contains three secondary overlays. The figures are plotted in the second primary overlay.

```
      OVERLAY (DICK,0,0)                                                    A   0
      PROGRAM EXEC (INPUT=201,OUTPUT,TAPE5=INPUT,TAPE7,TAPE1)               A  10
C                                                                           A  20
C                                                                           A  21
C*****************************************************************************
C                                                                             23
C*****************************************************************************
C                                                                           A  25
C     TRANSONIC FLOW ABOUT LIFTING WING-BODY COMBINATIONS                   A  30
C                                                                           A  40
C     A3746-4                                                               A  50
C                                                                           A  60
C                                                                           A  70
C     VARIAN PLOT CONTROL CARD SHOULD BE                                    A  80
C     PLOT.VARIAN%                 FSH=12.,FSV=11.)                         A  90
C                                                                           A 100
      COMMON /CALLP/ NREAD,NCASES                                           A 110
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH    A 120
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1,    A 130
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                       A 140
      NREAD=0                                                               A 150
      READ 30, NCASES,NPLOT                                                 A 160
      DO 20 I=1,NCASES                                                      A 170
      CALL OVERLAY (4HDICK,1,0,6HRECALL)                                    A 180
      IF (NPLOT.EQ.1) CALL OVERLAY (4HDICK,2,0,6HRECALL)                    A 190
   20 CONTINUE                                                              A 200
      STOP 0101                                                             A 210
C                                                                           A 220
   30 FORMAT (10I5)                                                         A 230
      END                                                                   A 240-
```

```
      OVERLAY (DICK,1,0)                                                    B    0
      PROGRAM ONEO                                                          B   10
C                                                                           B   20
      COMMON SIGMA,DELTA,I,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF,DE   B   30
     1LETA,PIR,CON4,CON5,H,JT,JI,JF,DPHIMX,DX,JXN,SNO,CS2O,SNALP,IJW,JW1   B   40
     2O,JW2O,JW1X,JW3X,BETA,JW3M1,DLTPH,JCHCK,IW,JW1OM2,JW3P1,JW1OM1,M,X   B   50
     3WM,XWMSQR,PI,AK2,AX2,AK1,AX1,AX1O,CNX,NAMXP1,A1,A2,ZMACH,JMCK        B   60
      COMMON R(120),SPRIME(120),FUN(120),XW(120),Y1(120),Y2(120),FUN1(12    B   70
     1O),FUNO(120),IFUN(120),FUN2(120),FUN3(120),FUN4(120),IGUN(120),CP(   B   80
     2120),FUNX(120),SLAS(120,6),CPO(120),KLOA(120),KUPA(120),FUN5(120),   B   90
     3FUN6(120),FUN7(120),FUNY(120),CP1(120),CP2(120)                       B  100
      COMMON FUN8(120),FUN9(120),FUN10(120),FUN11(120),Y2PRM(120),FUN12(    B  110
     1120),FUNA(120),FUNB(120)                                              B  120
      COMMON CON7(100),CON8(100),CON9(100),CON10(100),CON11(100),CON1(10    B  130
     1O),CON2(100),CON3(100),OMEGA(100),ABAR(100),BBAR(100),CBAR(100),DB   B  140
     2AR(100),PHIO(100),RW(100),RWR(100),AXOCR(100),ACHK(100),PHIOLD(100   B  150
     3),BCHK(100)                                                           B  160
      COMMON PHIUO(25),OMEGAU(25),ACHKU(25),BBARU(25),CBARU(25),DBARU(25    B  170
     1),BCHKU(25),PHIOU(25)                                                 B  180
      COMMON IFUM(50),VLAM(50),VTAU(50),VLAMP(50),VTAUP(50),YV(50),ZV(50    B  190
     1),FUNAO(50),FUNBO(50),UUOD(50),UU9OD(50)                              B  200
      COMMON PHI(109,50),PHIU(50,25),COEF(21)                               B  210
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH    B  220
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1,   B  230
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                       B  240
      DIMENSION IDATE(2)                                                    B  250
C                                                                           B  260
      NAMELIST /NAME/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH    B  270
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1,   B  280
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                       B  290
C                                                                           B  300
      CALL DAYTIM (IDATE)                                                   B  310
      PRINT 30, IDATE                                                       B  320
      PRINT 20                                                              B  330
      PRINT 30, IDATE                                                       B  340
      PRINT 10                                                              B  350
      READ (5,NAME)                                                         B  360
      REWIND 1                                                              B  370
      PRINT NAME                                                            B  380
      PRINT 20                                                              B  390
      CALL OVERLAY (4HDICK,1,1,6HRECALL)                                    B  400
      PRINT 20                                                              B  410
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      CALL OVERLAY (4HDICK,1,2,6HRECALL)                                B 420
      PRINT 20                                                          B 430
      CALL OVERLAY (4HDICK,1,3,6HRECALL)                                B 440
      RETURN                                                            B 450
C                                                                       B 460
   10 FORMAT (//54H RUBY DAVIS - SUBSONIC-TRANSONIC AERODYNAMICS DIVISID B 470
     1N/31H FOR DICK BARNWELL     A3746 - 4/52H TRANSONIC FLOW ABOUT LIFT B 480
     2ING WING-BODY COMBINATIONS/)                                      B 490
   20 FORMAT (1H1//)                                                    B 500
   30 FORMAT (8A10)                                                     B 510
      END                                                               B 520-
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```
      OVERLAY (DICK,1,1)                                                C    0
      PROGRAM START                                                     C   10
      COMMON SIGMA,DELTA,I,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF,DE C   20
     1LETA,PIR,CON4,CON5,H,JT,JI,JF,DPHIMX,DX,JXN,SNO,CS2O,SNALP,IJW,JW1 C   30
     2O,JW2O,JW1X,JW3X,BETA,JW3M1,DLTPH,JCHCK,IW,JW1OM2,JW3P1,JW1OM1,M,X C   40
     3WM,XWMSQR,PI,AK2,AX2,AK1,AX1,AX1O,CNX,NAMXP1,A1,A2,ZMACH,JMCK     C   50
      COMMON R(120),SPRIME(120),FUN(120),XW(120),Y1(120),Y2(120),FUN1(12 C   60
     1O),FUNO(120),IFUN(120),FUN2(120),FUN3(120),FUN4(120),IGUN(120),CP( C   70
     2120),FUNX(120),SLAS(120,6),CPO(120),KLOA(120),KUPA(120),FUN5(120), C   80
     3FUN6(120),FUN7(120),FUNY(120),CP1(120),CP2(120)                   C   90
      COMMON FUN8(120),FUN9(120),FUN1O(120),FUN11(120),Y2PRM(120),FUN12( C  100
     1120),FUNA(120),FUNB(120)                                          C  110
      COMMON CON7(100),CON8(100),CON9(100),CON1O(100),CON11(100),CON1(10 C  120
     1O),CON2(100),CON3(100),OMEGA(100),ABAR(100),BBAR(100),CBAR(100),DB C  130
     2AR(100),PHIO(100),RW(100),RWR(100),AXOCR(100),ACHK(100),PHIOLD(100 C  140
     3),BCHK(100)                                                       C  150
      COMMON PHIUO(25),OMEGAU(25),ACHKU(25),BBARU(25),CBARU(25),DBARU(25 C  160
     1),BCHKU(25),PHIOU(25)                                             C  170
      COMMON IFUM(50),VLAM(50),VTAU(50),VLAMP(50),VTAUP(50),YV(50),ZV(50 C  180
     1),FUNAO(50),FUNBO(50),UUOD(50),UU9OD(50)                          C  190
      COMMON PHI(109,50),PHIU(50,25),COEF(21)                           C  200
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH C  210
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1, C  220
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                   C  230
C                                                                       C  240
C     PART 1   VARIOUS CONSTANTS,AXIAL AND RADIAL GRIDS                 C  250
C                                                                       C  260
      RAD=57.29577951308                                                C  270
      SNALP=SIN(ALPHAD/RAD)                                             C  280
      SNO=SIN(OMEGAD/RAD)                                               C  290
      CS2O=1.-2.*SNO**2                                                 C  300
      IW=0                                                              C  310
      IF (ABS(SNO).LT.1.E-06.AND.ABS(SNALP).GT.1.E-06.AND.HSPAN.GT.RMAX) C  320
     1  IW=1                                                            C  330
      SIGMA=SNALP**2                                                    C  340
      DELTA=RMAX                                                        C  350
      I=0                                                               C  360
      BETASQ=1.-AMINF**2                                                C  370
      AJ1=J1                                                            C  380
      AJ2=J2                                                            C  390
      AJ3=J3                                                            C  400
      DX=1./(AJ3-AJ2)                                                   C  410
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```
      DDX=(AJ2-AJ1)*DX                                                  C 420
      JJF=J4-J1+1                                                       C 430
      DO 10 JJ=1,JJF                                                    C 440
   10 XW(J1+JJ-1)=FLOAT(JJ-1)*DX-DDX                                    C 450
      IF (J1.EQ.1) GO TO 30                                             C 460
      J1M1=J1-1                                                         C 470
      DO 20 JJ=1,J1M1                                                   C 480
      JJM1=JJ-1                                                         C 490
      J=J1-JJ                                                           C 500
      JP1=J+1                                                           C 510
   20 XW(J)=XW(JP1)-DX*FAC**JJM1                                        C 520
   30 IF (J4.EQ.J5) GO TO 50                                            C 530
      J5MJ4=J5-J4                                                       C 540
      DO 40 JJ=1,J5MJ4                                                  C 550
      JJM1=JJ-1                                                         C 560
      J=J4+JJ                                                           C 570
      JM1=J-1                                                           C 580
   40 XW(J)=XW(JM1)+DX*FAC**JJM1                                        C 590
   50 DXR=1./DX                                                         C 600
      DXSQR=DXR**2                                                      C 610
      GAMP1=(GAMMA+1.)*AMINF**2                                         C 620
      GP1DXR=GAMP1*DXR                                                  C 630
      KMM1=KM-1                                                         C 640
      KF=KMM1                                                           C 650
      IF (IWALL.NE.0) KF=KM                                             C 660
      KFM1=KF-1                                                         C 670
      AKM=KM                                                            C 680
      DELETA=1./AKM                                                     C 690
      DO 60 K=2,KF                                                      C 700
      AK=K                                                              C 710
      ETA=AK*DELETA                                                     C 720
      BMAEK=B-A*ETA                                                     C 730
      ETAR=1./(ETA+BMAEK*RCOM)                                          C 740
      BMAEKR=1./BMAEK                                                   C 750
      CON1(K)=.5*DELETA*BMAEKR*(B*ETAR-2.*A)                            C 760
      CON=(B*DELETA*BMAEKR)**2                                          C 770
      CON2(K)=CON*BMAEKR**2                                             C 780
   60 CON3(K)=CON*ETAR**2                                               C 790
      CON1(1)=1.                                                        C 800
      BMADE=B-A*DELETA                                                  C 810
      BMADER=1./BMADE                                                   C 820
      TBMADE=2.*B-A*DELETA                                              C 830
      TBMADR=1./TBMADE                                                  C 840
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      BMTADE=B-2.*A*DELETA                                                    C 850
      BMTADR=1./BMTADE                                                        C 860
      F1=DELETA+BMADE*RCOM                                                    C 870
      F2=3.*DELETA+(2.*B-3.*A*DELETA)*RCOM                                    C 880
      CON=8.*(B*DELETA)**2*BMTADR*TBMADR/F2                                   C 890
      CON2(1)=CON*F1*BMADER**2                                                C 900
      CON3(1)=CON/F1                                                          C 910
      PI=3.141592654                                                          C 920
      PIR=1./PI                                                               C 930
      CON4=PIR*B*DELETA*(2.*B-3.*A*DELETA)/F2*BMTADR*BMADER                   C 940
      IF (IWALL.NE.0) H=P*B*DELETA/(B-A)**2*(1.+.5*B*DELETA/(B-A))            C 950
      JI=2                                                                    C 960
      JF=J5-1                                                                 C 970
      IF (AMINF.LE.1.) GO TO 70                                               C 980
      JI=3                                                                    C 990
   70 JT=JI+JF                                                                C1000
      DO 90 K=1,KF                                                            C1010
      AK=K                                                                    C1020
      ETA=AK*DELETA                                                           C1030
      RW(K)=ETA/(B-A*ETA)+RCOM                                                C1040
      ARG=1.+BETASQ*RW(K)**2                                                  C1050
      IF (ARG.LT.0.) GO TO 80                                                 C1060
      AXOCR(K)=1./SQRT(ARG)                                                   C1070
   80 RWR(K)=SNALP*SNO/RW(K)                                                  C1080
      CON10(K)=CON2(K)*SNALP*SNO*RW(K)                                        C1090
      CON11(K)=CON2(K)*RW(K)**2                                               C1100
      CON7(K)=2.*CON3(K)*RWR(K)**2                                            C1110
      CON8(K)=SNALP**2*CON2(K)*RW(K)**2                                       C1120
      CON9(K)=SNALP**2*CON2(K)*RW(K)                                          C1130
   90 ABAR(K)=1.-CON1(K)                                                      C1140
C                                                                             C1150
C     PART 2   BODY GEOMETRY                                                  C1160
C                                                                             C1170
      J2M1=J2-1                                                               C1180
      DO 100 J=1,J2M1                                                         C1190
      R(J)=0.                                                                 C1200
  100 SPRIME(J)=0.                                                            C1210
      COM=RC*RMAX                                                             C1220
      JSM1=JS-1                                                               C1230
      IF (IR.EQ.1) GO TO 120                                                  C1240
      IF (IR.EQ.2) GO TO 140                                                  C1250
      IF (IR.EQ.3) GO TO 160                                                  C1260
      IF (IR.EQ.4) GO TO 180                                                  C1270
```

```
      DO 110 J=J2,JSM1                                                  C1280
      Y=1.-XW(J)                                                        C1290
      R(J)=COM*(Y-Y**RN)                                                C1300
  110 SPRIME(J)=2.*PI*COM*(RN*Y**(RN-1.)-1.)*R(J)                       C1310
      GO TO 220                                                         C1320
  120 DO 130 J=J2,JSM1                                                  C1330
      R(J)=COM*(XW(J)-XW(J)**RN)                                        C1340
  130 SPRIME(J)=2.*PI*COM*(1.-RN*XW(J)**(RN-1.))*R(J)                   C1350
      GO TO 220                                                         C1360
  140 DO 150 J=J2,JSM1                                                  C1370
      Y=1.-2.*XW(J)                                                     C1380
      R(J)=RMAX*SQRT(ABS(1.-Y**2))                                      C1390
  150 SPRIME(J)=4.*PI*RMAX**2*Y                                         C1400
      SPRIME(J2)=0.                                                     C1410
      GO TO 220                                                         C1420
  160 DO 170 J=J2,JSM1                                                  C1430
      R(J)=RMAX*XW(J)                                                   C1440
  170 SPRIME(J)=2.*PI*RMAX*R(J)                                         C1450
      GO TO 220                                                         C1460
  180 DO 210 J=J2,JSM1                                                  C1470
      IF (XW(J).GT..25) GO TO 190                                       C1480
      R(J)=8.*RMAX*XW(J)*(1.-2.*XW(J))                                  C1490
      SPRIME(J)=2.*PI*R(J)*8.*RMAX*(1.-4.*XW(J))                        C1500
      GO TO 210                                                         C1510
  190 IF (XW(J).GT..75) GO TO 200                                       C1520
      R(J)=RMAX                                                         C1530
      SPRIME(J)=0.                                                      C1540
      GO TO 210                                                         C1550
  200 R(J)=8.*RMAX*(1.-XW(J))*(2.*XW(J)-1.)                             C1560
      SPRIME(J)=2.*PI*R(J)*8.*(3.-4.*XW(J))*RMAX                        C1570
  210 CONTINUE                                                          C1580
  220 DO 230 J=JS,J5                                                    C1590
      R(J)=RS                                                           C1600
  230 SPRIME(J)=0.                                                      C1610
C                                                                       C1620
C     PART 3   WING GEOMETRY                                            C1630
C                                                                       C1640
      IF (JW3.GT.JW2) CAA1=HSPAN/(XW(JW3)-XW(JW2))                      C1650
      JW1P1=JW1+1                                                       C1660
      JW2P1=JW2+1                                                       C1670
      JW3P1=JW3+1                                                       C1680
      M=JW3                                                             C1690
      ZMACH=0.                                                          C1700
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```
      DO 240 J=1,JW1                                                    C1710
      FUNA(J)=1.                                                        C1720
      FUNB(J)=0.                                                        C1730
      FUN5(J)=0.                                                        C1740
      FUN6(J)=0.                                                        C1750
      FUN7(J)=0.                                                        C1760
      FUN2(J)=0.                                                        C1770
      FUN3(J)=R(J)**2                                                   C1780
      FUN4(J)=0.                                                        C1790
      IGUN(J)=IDIR                                                      C1800
      Y2PRM(J)=0.                                                       C1810
      FUNO(J)=0.                                                        C1820
      Y2(J)=0.                                                          C1830
      IFUN(J)=0                                                         C1840
  240 FUN(J)=0.                                                         C1850
      CNN1=1./(XW(JW3)-XW(JW1))                                         C1860
      CNN2=HSPAN**4*CNN1**3*GAMP1*(1.+2.*DEL)**2                        C1870
      DELP1=DEL+1.                                                      C1880
      TDELP1=2.*DEL+1.                                                  C1890
      DELSQ=DEL**2                                                      C1900
      CNX=1.                                                            C1910
      IF (SNO.LT.-1.E-06) CNX=-1.                                       C1920
      CNNA=CNX*HSPAN*TDELP1*CNN1*SNALP                                  C1930
      CNNAO=HSPAN*TDELP1*CNN1                                           C1940
      CNNB=-CNX*HSPAN*TDELP1*DELSQ*CNN1**2*SNALP                        C1950
      JW1O=JW1P1                                                        C1960
      JW2O=JW2+1                                                        C1970
      CNN6=(GAMP1*CNN1**3)**3*(HSPAN**2*TDELP1)**4/128.                 C1980
      JCHCK=JW3                                                         C2000
      IF (IWING.EQ.0) GO TO 250                                         C2010
      A2=-B2*(XW(JWO)-XW(JW1))                                          C2020
      AX2=(HSPAN-A2)/B2                                                 C2030
      AY2=A2+B2*AX2                                                     C2040
      IF (AY2.LT.1.E-06) AY2=1.E-06                                     C2050
      AK2=B2/(DEL*AY2)                                                  C2060
      IF (IWING.NE.2.AND.IWING.NE.-2) GO TO 250                         C2070
      A1=R(JW1)                                                         C2080
      AX1=-(A2-A1)/(B2-B1)                                              C2090
      AX1O=AX1+XW(JW1)                                                  C2100
      AY1=A1+B1*AX1                                                     C2110
      IF (AY1.LT.1.E-06) AY1=1.E-06                                     C2120
      AK1=(B2-B1)/(AY1*ABS(DEL1))                                       C2130
      JCHCK=JW1                                                         C2140
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250 DO 410 J=JW1P1,JW3                                                  C2150
    FUNA(J)=1.                                                          C2160
    FUNB(J)=0.                                                          C2170
    IF (IWING.NE.0) GO TO 260                                           C2180
    AX=(XW(JW3)-XW(J))*CNN1                                             C2190
    CNN3=SQRT(ABS(DELSQ+TDELP1*AX**2))                                  C2200
    CNN4=1./CNN3                                                        C2210
    Y2(J)=HSPAN*(DELP1-CNN3)                                            C2220
    FUNO(J)=HSPAN**2*CNN1*(DELP1*CNN4-1.)*TDELP1*AX                     C2230
    IF (Y2(J).LT.R(J)) GO TO 400                                        C2240
    ROY2E4=(R(J)/Y2(J))**4                                              C2250
    FACO=1.-ROY2E4                                                      C2260
    FUN(J)=.5*FACO**2*CNN2*(DELP1*CNN4-1.)*(1.-DELP1*DELSQ*CNN4**3)*AX  C2270
   1+2.*FACO*ROY2E4*FUNO(J)**3/Y2(J)**2*GAMP1                           C2280
    FUNOJ=FUNO(J)                                                       C2290
    FUN2(J)=FACO*FUNO(J)                                                C2300
    FUNO(J)=.5*FACO*(HSPAN*CNN1)**2*(1.-DELP1*DELSQ*CNN4**3)*TDELP1+2.  C2310
   1*ROY2E4*(FUNO(J)/Y2(J))**2                                          C2320
    IF (J.GT.JW2) GO TO 340                                             C2330
    GO TO 320                                                           C2340
260 AX=XW(J)-XW(JW1)                                                    C2350
    BX=AK2*(AX-AX2)                                                     C2360
    IF (BX.LT.-100.) BX=-100.                                           C2370
    IF (BX.GT.100.) BX=100.                                             C2380
    IF (ABS(BX).LT.1.E-06) GO TO 270                                    C2390
    CX=EXP(-BX)                                                         C2400
    XD=1./(1.-CX)                                                       C2410
    Y2(J)=-B2*(AX-AX2)*XD                                               C2420
    Y2JP=-B2*(1.-(1.+BX)*CX)*XD**2                                      C2430
    Y2JDP=-B2*AK2*CX*(BX*(1.+CX)*XD-2.)*XD**2                           C2440
    GO TO 280                                                           C2450
270 Y2(J)=-B2/BX                                                        C2460
    Y2JP=-.5*B2                                                         C2470
    Y2JDP=-.5*B2*AK2                                                    C2480
280 IF (IWING.EQ.2.OR.IWING.EQ.-2) GO TO 290                            C2490
    Y2(J)=A2+B2*AX+Y2(J)                                                C2500
    Y2JP=B2+Y2JP                                                        C2510
    GO TO 310                                                           C2520
290 BX=AK1*(AX-AX1)                                                     C2530
    IF (XW(J).LT.AX10) JCHCK=J-1                                        C2540
    IF (BX.LT.-100.) BX=-100.                                           C2550
    IF (BX.GT.100.) BX=100.                                             C2560
    IF (ABS(BX).LT.1.E-06) GO TO 300                                    C2570
```

```
      CX=EXP(-BX)                                                          C2580
      XD=1./(1.-CX)                                                        C2590
      Y2(J)=Y2(J)+(B2-B1)*(AX-AX1)*XD+A1+B1*AX                             C2600
      Y2JP=Y2JP+(B2-B1)*(1.-(1.+BX)*CX)*XD**2+B1                           C2610
      Y2JDP=Y2JDP+(B2-B1)*AK1*CX*(BX*(1.+CX)*XD-2.)*XD**2                  C2620
      GO TO 310                                                            C2630
  300 Y2(J)=Y2(J)+A1+B1*AX+(B2-B1)/BX                                      C2640
      Y2JP=Y2JP+.5*(B2-B1)                                                 C2650
  310 IF (Y2(J).LT.R(J)) GO TO 400                                         C2660
      JG=J-JW10+3 $ FUNAO(JG)=1. $ FUNBO(JG)=0.                            C2661
      ROY2E4=(R(J)/Y2(J))**4                                               C2670
      FACO=1.-ROY2E4                                                       C2680
      FUNOJ=Y2(J)*Y2JP                                                     C2690
      FUN2(J)=FACO*FUNOJ                                                   C2700
      FDP=Y2(J)*Y2JDP+Y2JP**2                                              C2710
      FUN(J)=.5*GAMP1*FACO*FUNOJ*FDP                                       C2720
      FUNO(J)=.5*FACO*FDP                                                  C2730
      IF (J.GT.JW2) GO TO 340                                              C2740
  320 FUN3(J)=.5*Y2(J)**2*(1.+ROY2E4)                                      C2750
      IJW=J+1                                                              C2760
      JW20=IJW                                                             C2770
      IF (IWING.NE.0) GO TO 330                                            C2780
      FUN4(J)=CNNA*AX*CNN4                                                 C2790
      FUN4(J)=FUN4(J)*(1.+(1.-2.*SNO**2)*(R(J)/Y2(J))**2)                  C2800
      Y2PRM(J)=CNNAO*AX*CNN4                                               C2810
      FUN5(J)=CNNB*CNN4**3                                                 C2820
      GO TO 360                                                            C2830
  330 FUN4(J)=CNX*SNALP*Y2JP                                               C2840
      FUN4(J)=FUN4(J)*(1.+(1.-2.*SNO**2)*(R(J)/Y2(J))**2)                  C2850
      Y2PRM(J)=Y2JP                                                        C2860
      FUN5(J)=CNX*SNALP*Y2JDP                                              C2870
      GO TO 360                                                            C2880
  340 Y1(J)=CAA1*(XW(J)-XW(JW2))                                           C2890
      IF (J.EQ.JW3) Y1(J)=Y2(J)                                            C2900
      IF (Y1(J).LE.R(J)) GO TO 320                                         C2910
      AKBAR=Y1(J)/Y2(J)                                                    C2920
      ANUM1=(1.-AKBAR)/(1.+AKBAR)                                          C2930
      FUN2(J)=.85*FACO*FUNO(J)*ANUM1                                       C2940
      ROY2E2=(R(J)/Y2(J))**2                                               C2950
      ROY1E2=(R(J)/Y1(J))**2                                               C2960
      AKPRM=1./((1.-ROY2E2)*Y2(J))*((1.+ROY1E2)*CAA1-(1.-ROY1E2)*(1.+ROY   C2970
     12E2)*Y1(J)*FUNOJ/((1.-ROY2E2)*Y2(J)))                                C2980
      FUN(J)=.7225*(FUN(J)*ANUM1-.5*GAMP1*(FUNOJ*FACO/(1.+AKBAR))**2*AKP   C2990
```

```
     1RM)                                                                    C3000
      FUNO(J)=.85*FUNO(J)*SQRT(ABS(ANUM1))                                   C3010
      IF (J.EQ.JW3) GO TO 350                                                C3020
      FUNO(J)=FUNO(J)-.425*FUNOJ*(1.-ROY2E4)*AKPRM/SQRT((1.-AKBAR)*(1.+A     C3030
     1KBAR)**3)                                                              C3040
  350 FUN4(J)=0.                                                             C3050
      FUN5(J)=0.                                                             C3060
      IF (IWING.EQ.0) Y2PRM(J)=CNNAO*AX*CNN4                                 C3070
      IF (IWING.NE.0) Y2PRM(J)=Y2JP                                          C3080
  360 IF (IVOR.EQ.0.OR.J.GT.JW10) GO TO 370                                  C3090
      RBP=.5*PIR*SPRIME(J)/R(J)                                              C3100
      CHEKK=(Y2(J)-R(J))/((Y2PRM(J)-RBP)*DX)                                 C3110
      IF (CHEKK.LT..1) GO TO 400                                             C3120
  370 ETA=0.                                                                 C3130
      KJ=0                                                                   C3140
  380 ETA=ETA+DELETA                                                         C3150
      KJ=KJ+1                                                                C3160
      RAD=ETA/(B-A*ETA)+RCOM                                                 C3170
      IF (RAD.GT.Y2(J)) GO TO 390                                            C3180
      GO TO 380                                                              C3190
  390 IFUN(J)=KJ-1                                                           C3200
      IF (IFUN(J).EQ.0) IFUN(J)=1                                            C3210
      IGUN(J)=IDIR+IFUN(J)                                                   C3220
      GO TO 410                                                              C3230
  400 IFUN(J)=0                                                              C3240
      IGUN(J)=IDIR                                                           C3250
      FUN4(J)=0.                                                             C3260
      FUN5(J)=0.                                                             C3270
      FUN6(J)=0.                                                             C3280
      FUN7(J)=0.                                                             C3290
      Y2PRM(J)=0.                                                            C3300
      FUN(J)=0.                                                              C3310
      FUNO(J)=0.                                                             C3320
      IJW=J+1                                                                C3330
      FUN2(J)=.0                                                             C3340
      FUN3(J)=R(J)**2                                                        C3350
      JW10=J+1                                                               C3360
  410 CONTINUE                                                               C3370
      FUNAO(2)=1.                                                            C3371
      JMCK=JW10-1                                                            C3372
      JW10M2=JW10-2                                                          C3380
      JW3P1=JW3+1                                                            C3390
      JW10M1=JW10-1                                                          C3400
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```
      JW3M1=JW3-1                                                       C3410
      IF (IJW.EQ.JW3P1) GO TO 430                                       C3420
      DO 420 J=IJW,JW3                                                  C3430
  420 FUN3(J)=FUN3(J-1)+.5*DX*(FUN2(J)+FUN2(J-1))                       C3440
  430 DO 440 J=JW3P1,J5                                                 C3450
      FUNA(J)=1.                                                        C3460
      FUN8(J)=0.                                                        C3470
      FUN5(J)=0.                                                        C3480
      FUN6(J)=0.                                                        C3490
      FUN7(J)=0.                                                        C3500
      FUN2(J)=0.                                                        C3510
      FUN3(J)=FUN3(JW3)                                                 C3520
      FUN4(J)=0.                                                        C3530
      IGUN(J)=IGUN(JW3)                                                 C3540
      Y2PRM(J)=0.                                                       C3550
      Y2(J)=Y2(JW3)                                                     C3560
      IFUN(J)=IFUN(JW3)                                                 C3570
      FUN0(J)=0.                                                        C3580
  440 FUN(J)=0.                                                         C3590
      DO 450 J=_,J2                                                     C3600
      IF (XW(J).LT.-1.) GO TO 450                                       C3610
      JXN=J                                                             C3620
      GO TO 460                                                         C3630
  450 CONTINUE                                                          C3640
  460 DLTPH=0.                                                          C3650
      IF (IWING.LT.0) CALL MACH                                         C3651
C                                                                       C3660
C     PART 4   VORTEX OVER WING                                         C3670
C                                                                       C3680
      IF (IVOR.EQ.0) GO TO 720                                          C3690
      IF (IVOR.NE.2) JCHCK=JW3                                          C3700
      JHKM1=JCHCK-1                                                     C3710
      JAM=128                                                           C3720
      AJAM=JAM                                                          C3730
      AJAMR=1./AJAM                                                     C3740
      ADX2=DX*AJAMR                                                     C3750
      Y2P=Y2PRM(JW10)                                                   C3760
      RBP=.5*PIR*SPRIME(JW10)/R(JW10)                                   C3770
      TOT=(1.-(Y2(JW10)-R(JW10))/(DX*(Y2P-RBP)))*AJAM+1.                C3780
      NTOT=TOT                                                          C3790
      JT=JAM-NTOT                                                       C3800
      AJT=JT                                                            C3810
      RB=R(JW10)-RBP*AJT*ADX2                                           C3820
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```
      Y2B=Y2(JW10)-Y2P*AJT*ADX2                                          C3830
      RATIO=FUNA(JW10)-FUNB(JW10)*AJT*ADX2                               C3840
      RATIOP=FUNB(J)                                                     C3841
      ANUMO=SNALP/(Y2P-RBP)*RATIO                                        C3850
      YA=-.00451+.56114*ANUMO-.12152*ANUMO**2                            C3860
      YVT=RB+(Y2B-RB)*(.99031-.98407*YA+2.29481*YA**2-1.78322*YA**3)     C3870
      ZVT=(Y2B-RB)*YA                                                    C3880
      HB=Y2B+RB**2/Y2B                                                   C3890
      HBP=(1.-(RB/Y2B)**2)*Y2P+2.*RB/Y2B*RBP                             C3900
      AF1=(Y2B-RB)/RB                                                    C3910
      AF2=(YVT-RB)/RB                                                    C3920
      AF3=ZVT/RB                                                         C3930
      ANUM1=AF2**2-AF1**2-AF3**2                                         C3940
      ETA=1.+.5*ANUM1                                                    C3950
      XI=AF2*AF3                                                         C3960
      ANUM2=SQRT(ANUM1**2+4.*(ETA*XI)**2)                                C3970
      BLAM=.70710678*SQRT(ANUM1+ANUM2)                                   C3980
      BTAU=ETA*XI/BLAM                                                   C3990
      JSTAT=JW10-1                                                       C4000
      IF (NTOT.LE.0) GO TO 470                                           C4010
      JJ2=JAM                                                            C4020
      JJ1=NTOT+1                                                         C4030
      GO TO 480                                                          C4040
  470 JJ2=JT                                                             C4050
      JJ1=1                                                              C4060
  480 DO 650 J=JSTAT,JW3                                                 C4070
      JG=J-JW10+3                                                        C4080
      L=JG                                                               C4090
      DO 640 JJ=JJ1,JJ2                                                  C4100
      AJJ=JJ                                                             C4110
      ADX3=ADX2                                                          C4120
      IQ=1                                                               C4130
      RBG=RB                                                             C4140
      Y2BG=Y2B                                                           C4150
      RBPG=RBP                                                           C4160
      Y2PG=Y2P                                                           C4170
      HBG=HB                                                             C4180
      HBPG=HBP                                                           C4190
      BLAMG=BLAM                                                         C4200
      BTAUG=BTAU                                                         C4210
      RATIOG=RATIO                                                       C4220
      RATIPG=RATIOP                                                      C4221
  490 AIQ=IQ                                                             C4230
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```
      AIQR=1./AIQ                                                        C4240
      DO 640 IS=1,IQ                                                     C4250
      AIS=IS                                                             C4260
      ABC1=AJAMR*(AJAM-AJJ+1.-(AIS-.5)*AIQR)                             C4270
      ABC2=1.-ABC1                                                       C4280
      ABC3=ABC1-.5*AJAMR*AIQR                                            C4290
      ABC4=1.-ABC3                                                       C4300
      IIC=1                                                              C4310
  500 ANUM1=1.+BLAM**2-BTAU**2                                           C4320
      ANUM2=SQRT(ANUM1**2+4.*(BLAM*BTAU)**2)                             C4330
      ETA=.70710678*SQRT(ANUM1+ANUM2)                                    C4340
      XI=BLAM*BTAU/ETA                                                   C4350
      CHCEK=Y2B/RB-1.                                                    C4360
      IF (CHCEK.LT..01) GO TO 510                                        C4370
      ANUM10=ETA**2+XI**2+4.*(RB/HB)**2                                  C4380
      ANUM20=SQRT(ABS(ANUM10**2-16.*(ETA*RB/HB)**2))                     C4390
      ARG=ETA**2+.5*(ANUM20-ANUM10)                                      C4400
      GO TO 520                                                          C4410
  510 AF1=(Y2B-RB)**2                                                    C4420
      AF2=BLAM**2-BTAU**2                                                C4430
      AF3=1./RB**2                                                       C4440
      ANUM10=.5*(AF1*AF3+AF2)                                            C4450
      ANUM20=AF3*SQRT(AF1*(AF1+2.*RB**2*AF2)+RB**4*(BLAM**2+BTAU**2)**2) C4460
      ARG=ANUM10+.5*ANUM20                                               C4470
  520 YVT=.5*HB*(ETA+SQRT(ABS(ARG)))                                     C4480
      ZVT=XI*HB*YVT/(2.*YVT-ETA*HB)                                      C4490
      ANUM=RB**2/(YVT**2+ZVT**2)                                         C4500
      FNUM2=HB*(BLAM**2+BTAU**2)                                         C4510
      AY=(YVT*BLAM+ZVT*BTAU)/FNUM2                                       C4520
      AZ=(YVT*BTAU-ZVT*BLAM)/FNUM2                                       C4530
      BY=(YVT**2-ZVT**2)**2-4.*(YVT*ZVT)**2                              C4540
      BZ=4.*YVT*ZVT*(YVT**2-ZVT**2)                                      C4550
      ANUM3=RB**4/(BY**2+BZ**2)                                          C4560
      BYO=1.-ANUM3*BY                                                    C4570
      BZO=-ANUM3*BZ                                                      C4580
      CY=AY*BYO-AZ*BZO                                                   C4590
      CZ=AZ*BYO+AY*BZO                                                   C4600
      DY=(AY**2-AZ**2)*BYO-2.*AY*AZ*BZO                                  C4610
      DZ=2.*AY*AZ*BYO+(AY**2-AZ**2)*BZO                                  C4620
      ANUM4=1./(YVT**2+ZVT**2)                                           C4630
      ANUM5=ANUM*ANUM4                                                   C4640
      DYO=1.+3.*(YVT**2-ZVT**2)*ANUM5                                    C4650
      DZO=6.*YVT*ZVT*ANUM5                                               C4660
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      ANUM6=1./(BYO**2+BZO**2)                                          C4670
      EY=ANUM6*(BYO*DYO+BZO*DZO)                                        C4680
      EZ=ANUM6*(BYO*DZO-BZO*DYO)                                        C4690
      FY=ANUM4*(ZVT*(EY-DY)-YVT*(DZ-EZ))                                C4700
      FZ=ANUM4*(YVT*(DY-EY)+ZVT*(EZ-DZ))                                C4710
      IF (J.GT.JCHCK) GO TO 530                                         C4720
      IF (J.EQ.JCHCK.AND.JJ.GE.2) GO TO 530                             C4730
      GAN=.5*HB*(BLAM+BTAU**2/BLAM)                                     C4740
      GAN=GAN*RATIO                                                     C4750
      GANSAV=GAN                                                        C4760
      AMY=(YVT-Y2B)*HB*RATIO  *.5/GAN*(1.-(BTAU/BLAM)**2)               C4770
      AMZ=ZVT*HB*RATIO  *.5/GAN*(1.-(BTAU/BLAM)**2)                     C4780
      ANY=(YVT-Y2B)*HB*RATIO  *BTAU/(GAN*BLAM)                          C4790
      ANZ=ZVT*HB*RATIO  *BTAU/(GAN*BLAM)                                C4800
      APY=(YVT-Y2B)/RATIO                                               C4801
      APZ=ZVT/RATIO                                                     C4802
      AOY=(YVT-Y2B)/HB                                                  C4810
      AOZ=ZVT/HB                                                        C4820
      GO TO 540                                                         C4830
  530 GAN=GANSAV                                                        C4840
      AMY=0.                                                            C4850
      AMZ=0.                                                            C4860
      ANY=0.                                                            C4870
      ANZ=0.                                                            C4880
      AOY=0.                                                            C4890
      AOZ=0.                                                            C4900
      APY=0.                                                            C4900
      APZ=0.                                                            C4902
  540 ANUM7=HB*BYO*ANUM4*ANUM6                                          C4910
      ANUM8=HB*BZO*ANUM4*ANUM6                                          C4920
      ANUM9=BLAM*YVT+BTAU*ZVT                                           C4930
      ANUM10=BTAU*YVT-BLAM*ZVT                                          C4940
      OY=ANUM7*ANUM9-ANUM8*ANUM10                                       C4950
      OZ=ANUM7*ANUM10+ANUM8*ANUM9                                       C4960
      GYO=(RB*ANUM4)**2*(YVT**2-ZVT**2)                                 C4970
      GZO=-2.*YVT*ZVT*(RB*ANUM4)**2                                     C4980
      GY=ANUM4/((1.-GYO)**2+GZO**2)*(YVT*(1.-GYO)+ZVT*GZO)              C4990
      GZ=ANUM4/((1.-GYO)**2+GZO**2)*(YVT*GZO-ZVT*(1.-GYO))              C5000
      GBARY=ANUM4*ANUM6*(YVT*BYO+ZVT*BZO)                               C5010
      GBARZ=ANUM4*ANUM6*(YVT*BZO-ZVT*BYO)                               C5020
      H11=OY*HB+AMY                                                     C5030
      H12=-OZ*HB+ANY                                                    C5040
      H21=OZ*HB+AMZ                                                     C5050
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      H22=OY*HB+ANZ                                                     C5060
      H1=-SNALP*(CZ*RATIO-.5*GAN*(CZ/(BLAM*HB)-FY))+RB*(YVT*ANUM4+2.*GY) C5070
     1*RBP-(OY*BLAM-OZ*BTAU+AOY+HB*GBARY)*HBP-APY*RATIOP                C5080
      H2=SNALP*(CY*RATIO-.5*GAN*(CY/(BLAM*HB)+FZ))+RB*(ZVT*ANUM4+2.     C5090
     1*GZ)*RBP-(OZ*BLAM+OY*BTAU+AOZ+HB*GBARZ)*HBP-APZ*RATIOP            C5100
      BNUMO=1./(H11*H22-H12*H21)                                        C5110
      BNUM1=H1*BNUMO                                                    C5120
      BNUM2=H2*BNUMO                                                    C5130
      BLAMP=BNUM1*H22-BNUM2*H12                                         C5140
      BTAUP=BNUM2*H11-BNUM1*H21                                         C5150
      IF (IIC.GT.1) GO TO 580                                           C5160
      IIC=2                                                             C5170
      BLAMO=BLAM                                                        C5180
      BTAUO=BTAU                                                        C5190
      BLAMP1=BLAMP                                                      C5200
      BTAUP1=BTAUP                                                      C5210
      BLAM=BLAM+.5*ADX3*BLAMP                                           C5220
      BTAU=BTAU+.5*ADX3*BTAUP                                           C5230
      IF (JJ.NE.1.OR.IQ.NE.1.OR.J.LT.JW10) GO TO 550                    C5240
      VLAMP(JG)=BLAMP                                                   C5250
      VTAUP(JG)=BTAUP                                                   C5260
      YV(JG)=YVT                                                        C5270
      ZV(JG)=ZVT                                                        C5280
      IF (J.EQ.JW3) GO TO 650                                           C5290
  550 IF (J.LT.JW10) GO TO 560                                          C5300
      RB=ABC1*R(J)+ABC2*R(J+1)                                          C5310
      Y2B=Y2(J)*ABC1+Y2(J+1)*ABC2                                       C5320
      RATIO=FUNA(J)*ABC1+FUNA(J+1)*ABC2                                 C5330
      RATIOP=FUNB(J)*ABC1+FUNB(J+1)*ABC2                                C5331
      RBP=.5*PIR*(SPRIME(J)/R(J)*ABC1+SPRIME(J+1)/R(J+1)*ABC2)          C5340
      Y2P=Y2PRM(J)*ABC1+Y2PRM(J+1)*ABC2                                 C5350
      GO TO 570                                                         C5360
  560 RB=R(JW10)-ABC1*DX*RBP                                            C5370
      Y2B=Y2(JW10)-ABC1*DX*Y2P                                          C5380
      RATIO=FUNA(JW10)-ABC1*DX*FUNB(JW10)                               C5390
      RATIOP=FUNB(JW10)                                                 C5391
  570 HB=Y2B+RB**2/Y2B                                                  C5400
      HBP=Y2P*(1.-(RB/Y2B)**2)+2.*RB/Y2B*RBP                            C5410
      GO TO 500                                                         C5420
  580 IF (IIC.GT.2) GO TO 590                                           C5430
      IIC=3                                                             C5440
      BLAM=BLAMO+.5*ADX3*BLAMP                                          C5450
      BTAU=BTAUO+.5*ADX3*BTAUP                                          C5460
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      BLAMP2=BLAMP                                                      C5470
      BTAUP2=BTAUP                                                      C5480
      GO TO 500                                                         C5490
  590 IF (IIC.GT.3) GO TO 630                                           C5500
      CHECKL=ABS((BLAMP2-BLAMP)/BLAMP2)                                 C5510
      CHECKU=ABS((BTAUP2-BTAUP)/BTAUP2)                                 C5520
      IF (CHECKL.LT..01.OR.CHECKU.LT..01) GO TO 600                     C5530
      RB=RBG                                                            C5540
      Y2B=Y2BG                                                          C5550
      RBP=RBPG                                                          C5560
      Y2P=Y2PG                                                          C5570
      HB=HBG                                                            C5580
      HBP=HBPG                                                          C5590
      BLAM=BLAMG                                                        C5600
      BTAU=BTAUG                                                        C5610
      IQ=2*IQ                                                           C5620
      ADX3=.5*ADX3                                                      C5630
      RATIO=RATIOG                                                      C5640
      RATIOP=RATIPG                                                     C5641
      GO TO 490                                                         C5650
  600 IIC=4                                                             C5660
      BLAM=BLAMO+ADX3*BLAMP                                             C5670
      BTAU=BTAUO+ADX3*BTAUP                                             C5680
      BLAMP3=BLAMP                                                      C5690
      BTAUP3=BTAUP                                                      C5700
      IF (J.LT.JW10) GO TO 610                                          C5710
      RB=ABC3*R(J)+ABC4*R(J+1)                                          C5720
      Y2B=ABC3*Y2(J)+ABC4*Y2(J+1)                                       C5730
      RATIO=FUNA(J)*ABC3+FUNA(J+1)*ABC4                                 C5740
      RATIOP=FUNB(J)*ABC3+FUNB(J+1)*ABC4                                C5741
      RBP=.5*PIR*(ABC3*SPRIME(J)/R(J)+ABC4*SPRIME(J+1)/R(J+1))          C5750
      Y2P=ABC3*Y2PRM(J)+ABC4*Y2PRM(J+1)                                 C5760
      GO TO 620                                                         C5770
  610 RB=R(JW10)-ABC3*DX*RBP                                            C5780
      Y2B=Y2(JW10)-ABC3*DX*Y2P                                          C5790
      RATIO=FUNA(JW10)-ABC3*DX*FUNB(JW10)                               C5800
      RATIOP=FUNB(JW10)                                                 C5801
  620 HB=Y2B+RB**2/Y2B                                                  C5810
      HBP=Y2P*(1.-(RB/Y2B)**2)+2.*RB/Y2B*RBP                            C5820
      GO TO 500                                                         C5830
  630 BLAM=BLAMO+(BLAMP1+2.*(BLAMP2+BLAMP3)+BLAMP)*ADX3/6.              C5840
  640 BTAU=BTAUO+(BTAUP1+2.*(BTAUP2+BTAUP3)+BTAUP)*ADX3/6.              C5850
      JAM=16                                                            C5860
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      AJAM=JAM                                                          C5870
      AJAMR=1./AJAM                                                     C5880
      ADX2=DX*AJAMR                                                     C5890
      JJ2=JAM                                                           C5900
      JJ1=1                                                             C5910
      VLAM(JG+1)=BLAM                                                   C5920
      VTAU(JG+1)=BTAU                                                   C5930
  650 CONTINUE                                                          C5940
      JG=JW2-JW10+3                                                     C5950
      IF (JCHCK.LT.JW2) GO TO 660                                       C5960
      DLTPH=2.*DX*SNALP*(2.*(Y2(JW2)+R(JW2)**2/Y2(JW2))*(VLAM(JG)*VLAMP(C5970
     1JG)+VTAU(JG)*VTAUP(JG))+((1.-(R(JW2)/Y2(JW2))**2)*Y2PRM(JW2)+PIR*SC5980
     2PRIME(JW2)/Y2(JW2))*(VLAM(JG)**2+VTAU(JG)**2))/(1.-VTAU(JG)**2)*FUC5990
     3NA(JW2)+2.*DX*SNALP*(Y2(JW2)+R(JW2)**2/Y2(JW2))*(VLAM(JG)**2+VTAU(C5991
     4JG)**2)/(1.-VTAU(JG)**2)*FUNB(JW2)                                C5992
      GO TO 670                                                         C6000
  660 JG1=JCHCK-JW10+3                                                  C6010
      GAN=.5*Y2(JCHCK)*(VLAM(JG1)+VTAU(JG1)**2/VLAM(JG1))               C6020
      GAN=GAN*(1.+(R(JCHCK)/Y2(JCHCK))**2)*FUNA(JCHCK)                  C6030
      DLTPH=2.*SNALP*GAN*DX*(((1.-VTAU(JG))/((1.-VTAU(JG))**2+VLAM(JG)**C6040
     12)+1./(1.+VTAU(JG)))*VLAMP(JG)+VLAM(JG)*(1./((1.-VTAU(JG))**2+VLAMC6050
     2(JG)**2)-1./(1.+VTAU(JG))**2)*VTAUP(JG))                          C6060
  670 DO 700 J=JW10,JW3                                                 C6070
      JG=J-JW10+3                                                       C6080
      IF (J.LE.JCHCK) GO TO 680                                         C6090
      DGANDX=0.                                                         C6100
      GO TO 690                                                         C6110
  680 GAN=.5*(Y2(J)+R(J)**2/Y2(J))*(VLAM(JG)+VTAU(JG)**2/VLAM(JG))      C6120
      DGANDX=.5*Y2PRM(J)*(1.-(R(J)/Y2(J))**2)*(VLAM(JG)+VTAU(JG)**2/VLAMC6130
     1(JG))+.5*(Y2(J)+R(J)**2/Y2(J))*VLAMP(JG)*(1.-(VTAU(JG)/VLAM(JG))**C6140
     22)+(Y2(J)+R(J)**2/Y2(J))*VTAU(JG)/VLAM(JG)*VTAUP(JG)              C6150
      DGANDX=DGANDX*FUNA(J)+GAN*FUNB(J)                                 C6160
      GAN=GAN*FUNA(J)                                                   C6170
  690 CP(J)=GAN*VLAM(JG)*(Y2(J)+R(J)**2/Y2(J))*2.                       C6180
  700 CPO(J)=((DGANDX*VLAM(JG)+GAN*VLAMP(JG))*(Y2(J)+R(J)**2/Y2(J))+GAN*C6190
     1VLAM(JG)*Y2PRM(J)*(1.-(R(J)/Y2(J))**2))*2.                        C6200
      DO 710 J=JW10,JW3                                                 C6210
      IF (J.EQ.JW10) DLFDP=DXR*(CPO(JW10+1)-CPO(JW10))                  C6220
      IF (J.EQ.JW3) DLFDP=DXR*(CPO(JW3)-CPO(JW3-1))                     C6230
      IF (J.GT.JW10.AND.J.LT.JW3) DLFDP=.5*DXR*(CPO(J+1)-CPO(J-1))      C6240
      FUN(J)=FUN(J)+.5*GAMP1*(2.*CPO(J)*FUNO(J)+DLFDP*(FUN2(J)+CPO(J)))C6250
      FUNO(J)=FUNO(J)+.5*DLFDP                                          C6260
      FUN2(J)=FUN2(J)+CPO(J)                                            C6270
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  710 FUN3(J)=FUN3(J)+CP(J)                                              C6280
                                                                         C6290
C                                                                        C6300
C     PART 5   MORE WING GEOMETRY                                        C6310
C                                                                        C6320
  720 DO 750 J=1,J5                                                      C6330
      FUN(J)=SIGMA*FUN(J)                                                C6334
      FUN1(J)=2.*SNALP*SNO*FUNO(J)                                       C6360
      FUNO(J)=SIGMA*FUNO(J)                                              C6370
      FUN4(J)=FUN4(J)-FUNO(J)                                            C6380
      IF (IVOR.EQ.0.OR.J.LT.JW10.OR.J.GT.JW3) GO TO 740                  C6390
      JG=J-JW10+3                                                        C6400
      IF (J.GT.JCHCK) GO TO 730                                          C6410
      HB=Y2(J)+R(J)**2/Y2(J)                                             C6420
      HBP=(1.-(R(J)/Y2(J))**2)*Y2PRM(J)+PIR*SPRIME(J)/R(J)               C6430
      FUN4(J)=FUN4(J)+SNALP*(HBP*(VLAM(JG)**2+VTAU(JG)**2)+2.*HB*(VLAM(J C6440
     1G)*VLAMP(JG)+VTAU(JG)*VTAUP(JG)))/(1.-VTAU(JG))*FUNA(J)+SNALP*HB*( C6450
     2VLAM(JG)**2+VTAU(JG)**2)/(1.-VTAU(JG))*FUNB(J)                     C6460
      FUNO(J)=FUNO(J)-SNALP*(HBP*(VLAM(JG)**2+VTAU(JG)**2)+2.*HB*(VLAM(J C6470
     1G)*VLAMP(JG)+VTAU(JG)*VTAUP(JG)))/(1.-VTAU(JG)**2)*VTAU(JG)*FUNA(J C6480
     2)-SNALP*HB*(VLAM(JG)**2+VTAU(JG)**2)/(1.-VTAU(JG)**2)*VTAU(JG)*FUN C6490
     3B(J)                                                               C6500
      GO TO 740                                                          C6510
  730 ADD1=GAN*((1.-VTAU(JG))*VLAMP(JG)+VLAM(JG)*VTAUP(JG))/((1.-VTAU(JG C6520
     1))**2+VLAM(JG)**2)                                                 C6530
      FUN4(J)=FUN4(J)+SNALP*ADD1                                         C6540
      ADD2=1./(1.+VTAU(JG))                                              C6550
      FUNO(J)=FUNO(J)-SNALP*(ADD1+GAN*ADD2*(VLAMP(JG)-VLAM(JG)*ADD2*VTAU C6560
     1P(JG)))                                                            C6570
  740 FUNY(J)=.25*CS20*FUN(J)                                            C6580
      FUN8(J)=FUN2(J)*FUN3(J)*2.*AMINF**2                                C6590
      FUN9(J)=0.                                                         C6600
      FUN10(J)=0.                                                        C6610
      IF (Y2(J).LT.1.E-06) GO TO 750                                     C6620
      FUN9(J)=FUN2(J)/Y2(J)**4*2.*AMINF**2                               C6630
      FUN10(J)=FUN9(J)*Y2(J)*PIR                                         C6640
      FUN9(J)=-FUN9(J)                                                   C6650
  750 FUNX(J)=FUNY(J)-.5*SIGMA*FUN2(J)                                   C6660
      CNNC=.125*SIGMA*CS20*DXR                                           C6670
      JW10P1=JW10+1                                                      C6680
      JW3M1=JW3-1                                                        C6690
      FUN6(JW10)=2.*CNNC*(FUN(JW10P1)-FUN(JW10))-FUNO(JW10)              C6700
      DO 760 J=JW10P1,JW3M1                                              C6710
  760 FUN6(J)=CNNC*(FUN(J+1)-FUN(J-1))-FUNO(J)
```

```
      FUN6(JW3)=2.*CNNC*(FUN(JW3)-FUN(JW3M1))-FUNO(JW3)                 C6720
      FUN7(JW1O)=DXR*(FUN6(JW1OP1)-FUN6(JW1O))                          C6730
      DO 770 J=JW1OP1,JW3M1                                             C6750
  770 FUN7(J)=.5*DXR*(FUN6(J+1)-FUN6(J-1))                              C6760
      FUN7(JW3)=DXR*(FUN6(JW3)-FUN6(JW3M1))                             C6770
C                                                                       C6790
C     PART 6   FAR-FIELD MACH LINES                                     C6800
C                                                                       C6810
      IF (AMINF.LE.1.) GO TO 850                                        C6820
      XWM=XW(M)                                                         C6830
      XWMSQR=1./XWM**2                                                  C6840
      BETA=SQRT(-BETASQ)                                                C6850
      J2P1=J2+1                                                         C6860
      DO 810 J=J2P1,J5                                                  C6870
      KUPA(J)=1                                                         C6880
      DO 780 K=1,KF                                                     C6890
      Z=XW(J)-BETA*RW(K)                                                C6900
      IF (Z.LT.XW(J2)) GO TO 790                                        C6910
  780 KUPA(J)=K                                                         C6920
  790 KUPA(J)=KUPA(J)-1                                                 C6930
      IF (J.LT.M) GO TO 810                                             C6940
      KLOA(J)=1                                                         C6950
      DO 800 K=1,KF                                                     C6960
      Z=XW(J)-BETA*RW(K)                                                C6970
      IF (Z.LT.XW(M)) GO TO 810                                         C6980
  800 KLOA(J)=K                                                         C6990
  810 CONTINUE                                                          C7000
      DO 820 J=J2P1,J5                                                  C7010
      IGUNP1=IGUN(J)+1                                                  C7020
      JW1X=J                                                            C7030
      IF (IGUNP1.LE.KUPA(J)) GO TO 830                                  C7040
  820 CONTINUE                                                          C7050
  830 DO 840 J=M,J5                                                     C7060
      IGUNP1=IGUN(J)+1                                                  C7070
      JW3X=J                                                            C7080
      IF (IGUNP1.LE.KLOA(J)) GO TO 850                                  C7090
  840 CONTINUE                                                          C7100
C                                                                       C7110
C     PART 7   INITIALIZATION OF VELOCITY POTENTIAL                     C7120
C                                                                       C7130
  850 DO 1000 J=1,J5                                                    C7140
      IGUNJ=IGUN(J)                                                     C7150
      IGUNP1=IGUNJ+1                                                    C7160
```

```
      DO 860 K=1,IGUNJ                                                  C7170
  860 PHI(J,K)=0.                                                       C7180
      IF (KF.NE.KM) PHI(J,KM)=0.                                        C7190
      IF (AMINF.GT.1.) GO TO 900                                        C7200
      DO 890 K=IGUNP1,KF                                                C7210
      IF (J.LT.JXN) GO TO 870                                           C7220
      IF (J.GT.J3) GO TO 870                                            C7230
      AX=1.                                                             C7240
      GO TO 880                                                         C7250
  870 AX=ABS(XW(J))                                                     C7260
  880 XOCR=AX/SQRT(AX**2+BETASQ*RW(K)**2)                               C7270
  890 PHI(J,K)=RWR(K)*(XOCR*FUN3(J)+.5*(1.-XOCR)*FUN3(JW3))+XOCR**2*FUNX C7280
     1(J)                                                               C7290
      KUPA(J)=KM                                                        C7300
      GO TO 1000                                                        C7310
  900 IF (J.GT.JW1X) GO TO 910                                          C7320
      KLO=IGUNP1                                                        C7330
      GO TO 980                                                         C7340
  910 IF (J.GT.JW3X) GO TO 920                                          C7350
      KUP=KUPA(J)                                                       C7360
      KLO=IGUNP1                                                        C7370
      GO TO 940                                                         C7380
  920 KUP=KLOA(J)                                                       C7390
      XWJ=XW(J)                                                         C7400
      DO 930 K=IGUNP1,KUP                                               C7410
      BRSQ=(BETA*RW(K))**2                                              C7420
      ANUM1=SQRT(XWJ**2-BRSQ)                                           C7430
      ANUM2=SQRT(ABS((XWJ-XWM)**2-BRSQ))                                C7440
  930 PHI(J,K)=RWR(K)*FUN3(M)*XWMSQR*(XWJ*ANUM1-(XWJ+XWM)*ANUM2+BRSQ*(AL C7450
     1OG(XWJ-XWM+ANUM2)-ALOG(XWJ+ANUM1)))                               C7460
      IF (KUP.EQ.KF) GO TO 1000                                         C7470
      KLO=KUP+1                                                         C7480
      KUP=KUPA(J)                                                       C7490
  940 Z=XW(J)-BETA*RW(KLO)                                              C7500
      JJ=-1                                                             C7510
  950 JJ=JJ+1                                                           C7520
      JX=J-JJ                                                           C7530
      IF (Z.LT.XW(JX)) GO TO 950                                        C7540
      DO 970 K=KLO,KUP                                                  C7550
      BR=BETA*RW(K)                                                     C7560
      Z=XW(J)-BR                                                        C7570
      JJ=-1                                                             C7580
  960 JJ=JJ+1                                                           C7590
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```
      JX=JX-JJ                                                          C7600
      IF (Z.LT.XW(JX)) GO TO 960                                        C7610
      ZR=1./Z                                                           C7620
  970 PHI(J,K)=RWR(K)*FUN3(JX)*(XW(J)*ZR**1.5*SQRT(XW(J)+BR)+(BR*ZR)**2*  C7630
     1(ALOG(BR)-ALOG(XW(J)+SQRT(XW(J)**2-BR**2))))+FUNX(J)              C7640
      IF (KUP.EQ.KF) GO TO 1000                                         C7650
      KLO=KUP+1                                                         C7660
  980 DO 990 K=KLO,KF                                                   C7670
  990 PHI(J,K)=0.                                                       C7680
 1000 CONTINUE                                                          C7690
C                                                                       C7700
C     PART 8   TUNNEL WALL                                              C7710
C                                                                       C7720
      IF (IWALL.EQ.0.OR.ALPHAD.EQ.0.) GO TO 1090                        C7730
      IF (IWALL.EQ.2) GO TO 1070                                        C7740
      CARRY=0.                                                          C7750
      CARRY1=0.                                                         C7760
      JWXZ=JW10                                                         C7770
      DO 1060 J=1,J5                                                    C7780
      IF (J.LE.JW10) GO TO 1050                                         C7790
      IF (P.EQ.0.) GO TO 1030                                           C7800
      IF (AMINF.LE.1.) GO TO 1010                                       C7810
      IF (KUPA(J).LT.KM) GO TO 1040                                     C7820
 1010 IF (J.GT.JW3) GO TO 1020                                          C7830
      EXP1=EXP((XW(JWXZ)-XW(J))/(P*RW(KM)))                             C7840
      EXP2=EXP1**2                                                      C7850
      EXP2R=1./EXP2                                                     C7860
      EXP4R=EXP2R**2                                                    C7870
      EXP1M=EXP((XW(JWXZ)-XW(J-1))/(P*RW(KM)))                          C7880
      EXP2M=EXP1M**2                                                    C7890
      EXP2MR=1./EXP2M                                                   C7900
      EXP4MR=EXP2MR**2                                                  C7910
      CARRY=CARRY+.5*(EXP2R+EXP2MR)*(FUN3(J)*EXP1-FUN3(J-1)*EXP1M)      C7920
      CARRY1=CARRY1+2.*(EXP2R+EXP2MR)*(FUNY(J)-FUNY(J-1))-.5*(EXP4R+EXP4  C7930
     1MR)*(FUN8(J)*EXP2-FUN8(J-1)*EXP2M)/RW(KM)**2*SIGMA*CS20           C7940
 1020 FUN11(J)=-EXP1/RW(KM)**2*CARRY                                    C7950
      FUN12(J)=-EXP2/RW(KM)**2*CARRY1                                   C7960
      GO TO 1060                                                        C7970
 1030 FUN11(J)=FUN3(J)/RW(KM)**2                                        C7980
      FUN12(J)=FUN8(J)/RW(KM)**4*SIGMA*CS20                             C7990
      GO TO 1060                                                        C8000
 1040 JWXZ=J                                                            C8010
 1050 FUN11(J)=0.                                                       C8020
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```
      FUN12(J)=0.                                                       C8030
 1060 CONTINUE                                                          C8040
      GO TO 1090                                                        C8050
 1070 ANUM0=(1.-P*RW(KM))/((1.+P*RW(KM))*RW(KM)**2)                     C8060
      ANUM1=(2.-P*RW(KM))/(RW(KM)**4*(2.+P*RW(KM)))*SIGMA*CS20          C8070
      ANUM2=P/(RW(KM)*(2.-P*RW(KM)))*4.                                 C8080
      DO 1080 J=1,J5                                                    C8090
      FUN12(J)=ANUM1*FUN8(J)-ANUM2*FUNY(J)                              C8100
 1080 FUN11(J)=FUN3(J)*ANUM0                                            C8110
C                                                                       C8120
C     PART 9   INITIALIZATION OF VELOCITY POTENTIAL UNDER WING          C8130
C                                                                       C8140
 1090 IF (IW.EQ.0) GO TO 1110                                           C8150
      KU=IFUN(JW3)                                                      C8160
      JGU=JW3-JW10+4                                                    C8170
      DO 1100 J=1,JGU                                                   C8180
      DO 1100 K=1,KU                                                    C8190
 1100 PHIU(J,K)=0.                                                      C8200
C                                                                       C8210
C     PART 10   INDEXING OF WING TRAILING EDGE                          C8220
C                                                                       C8230
 1110 IF (JW2.EQ.JW3) GO TO 1160                                        C8240
      JGP=JW20-JW10+2                                                   C8250
      DO 1120 J=1,JGP                                                   C8260
 1120 IFUM(J)=1                                                         C8270
      JGP=JGP+1                                                         C8280
      JGU=JW3-JW10+3                                                    C8290
      DO 1150 JJ=JGP,JGU                                                C8300
      J=JW10+JJ-3                                                       C8310
      K=0                                                               C8320
 1130 K=K+1                                                             C8330
      IF (RW(K).GT.Y1(J)) GO TO 1140                                    C8340
      GO TO 1130                                                        C8350
 1140 IFUM(JJ)=K                                                        C8360
      IF (K.EQ.IFUN(JW3).AND.JJ.LT.JGU) IFUM(JJ)=K-1                    C8370
 1150 CONTINUE                                                          C8380
      IF (IFUM(JGU).GT.IFUN(J)) IFUM(JGU)=IFUN(J)                       C8390
      GO TO 1180                                                        C8400
 1160 JGU=JW3-JW10+3                                                    C8410
      DO 1170 J=1,JGU                                                   C8420
 1170 IFUM(J)=1                                                         C8430
 1180 IFUM(JW3-JW10+4)=IFUN(JW3)+1                                      C8440
C                                                                       C8450
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C      PART 11   PRINTING                                                    C8460
C                                                                           C8470
       PRINT 1230, (K,RW(K),RWR(K),AXOCR(K),ABAR(K),K=1,KF)                 C8480
       PRINT 1240, (K,CON1(K),CON2(K),CON3(K),CON7(K),CON8(K),CON9(K),CON   C8490
      1 10(K),CON11(K),K=1,KF)                                              C8500
       PRINT 1250, (J,XW(J),R(J),SPRIME(J),Y2(J),Y1(J),FUN3(J),FUN2(J),FU   C8510
      1NO(J),J=1,J5)                                                        C8520
       PRINT 1260, (J,XW(J),FUN(J),FUN4(J),FUN1(J),FUN5(J),FUN6(J),FUN7(J   C8530
      1),FUNX(J),J=1,J5)                                                    C8540
       PRINT 1270, (J,XW(J),FUNY(J),FUNA(J),FUNB(J),IFUN(J),IGUN(J),KUPA(   C8550
      1J),KLOA(J),J=1,JW10M1)                                               C8560
       DO 1190 J=JW10,JW3P1                                                 C8570
       JG=J-JW10+3                                                          C8580
 1190  PRINT 1290, J,XW(J),FUNY(J),FUNA(J),FUNB(J),IFUN(J),IGUN(J),KUPA(J   C8590
      1),KLOA(J),IFUN(JG)                                                   C8600
       JW3P2=JW3+2                                                          C8610
       PRINT 1280, (J,XW(J),FUNY(J),FUNA(J),FUNB(J),IFUN(J),IGUN(J),KUPA(   C8620
      1J),KLOA(J),J=JW3P2,J5)                                               C8630
       IF (JW10.EQ.JW3P1) JW10=J3+1                                         C8640
       PRINT 1300                                                           C8650
       PRINT 1310, (J,XW(J),FUN8(J),FUN9(J),FUN10(J),FUN11(J),FUN12(J),Y2   C8660
      1PRM(J),J=1,J5)                                                       C8670
       IF (IVOR.EQ.0) GO TO 1220                                            C8680
       PRINT 1320                                                           C8690
       DO 1210 J=JW10,JW3                                                   C8700
       JG=J-JW10+3                                                          C8710
       IF (J.GT.JCHCK) GO TO 1200                                           C8720
       HB=Y2(J)+R(J)**2/Y2(J)                                               C8730
       HBP=(1.-(R(J)/Y2(J))**2)*Y2PRM(J)+PIR*SPRIME(J)/Y2(J)                C8740
       GAN=.5*HB*(VLAM(JG)+VTAU(JG)**2/VLAM(JG))                            C8750
       DGANDX=.5*(HBP*(VLAM(JG)+VTAU(JG)**2/VLAM(JG))+HB*(1.-(VTAU(JG)/VL   C8760
      1AM(JG))**2)*VLAMP(JG))+HB*VTAU(JG)/VLAM(JG)*VTAUP(JG)                C8770
       DGANDX=DGANDX*FUNA(J)+GAN*FUNB(J)                                    C8780
       GAN=GAN*FUNA(J)                                                      C8790
       GO TO 1210                                                           C8800
 1200  DGANDX=0.                                                            C8810
 1210  PRINT 1330, J,XW(J),VLAM(JG),VTAU(JG),VLAMP(JG),VTAUP(JG),GAN,DGAN   C8820
      1DX,YV(JG),ZV(JG),R(J),Y2(J)                                          C8830
 1220  IF (IWING.GE.0) GO TO 1222                                           C8831
       PRINT 1333                                                           C8832
       DO 1221 J=JW10,JW3                                                   C8833
       JG=J-JW10+3                                                          C8834
 1221  PRINT 1334, J,XW(J),FUNA(JG),FUNBO(JG),UUOD(JG),UU90D(JG)            C8835
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      IF (AMINF.GT.1.) GO TO 1222                                       C8840
      PRINT 1331                                                        C8841
      PRINT 1332, (NA,COEF(NA),NA=1,NAMXP1)                             C8842
 1222 PRINT 1340, SIGMA,DELTA,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF C8843
     1,DELETA,PIR,CON4,CON5,H,JT,JI                                     C8850
      PRINT 1350, JF,DX,JXN,SNO,CS2O,SNALP,IJW,JW1O,JW2O,JW1X,JW3X,BETA, C8860
     1JW3M1,DLTPH,JCHCK,IW,JW1OM2                                       C8870
      PRINT 1360, JW3P1,JW1OM1,M,XWM,XWMSQR                             C8880
      RETURN                                                            C8890
C                                                                       C8900
 1230 FORMAT (17H SUBROUTINE START////44H   ARRAYS AND PARAMETERS USED I C8910
     1N COMPUTATION/48H      J = AXIAL GRID INDEX, K = RADIAL GRID INDEX/ C8920
     2//3X,1HK,5X,5HRW(K),12X,6HRWR(K),9X,8HAXOCR(K),9X,7HABAR(K)//(I4,4 C8930
     3E16.8))                                                           C8940
 1240 FORMAT (//3X,1HK,5X,7HCON1(K),10X,7HCON2(K),9X,7HCON3(K),10X,7HCON C8950
     17(K),8X,7HCON8(K),9X,7HCON9(K),9X,8HCON10(K),9X,8HCON11(K)//(I4,8E C8960
     216.8))                                                            C8970
 1250 FORMAT (//3X,1HJ,5X,5HXW(J),12X,4HR(J),9X,9HSPRIME(J),8X,5HY2(J),1 C8980
     10X,5HY1(J),11X,7HFUN3(J),9X,7HFUN2(J),9X,7HFUNO(J)//(I4,8E16.8))  C8990
 1260 FORMAT (//3X,1HJ,5X,5HXW(J),12X,6HFUN(J),9X,7HFUN4(J),10X,7HFUN1(J C9000
     1),11X,7HFUN5(J),9X,7HFUN6(J),9X,7HFUN7(J),9X,7HFUNX(J)//(I4,8E16.8 C9010
     2))                                                                C9020
 1270 FORMAT (//3X,1HJ,5X,5HXW(J),11X,7HFUNY(J),9X,7HFUNA(J),10X,7HFUNB( C9030
     1J),9X,7HIFUN(J),2X,7HIGUN(J),2X,7HKUPA(J),2X,7HKLOA(J),2X,8HIFUM(J C9040
     2G)//(I4,4E16.8,4I9))                                              C9050
 1280 FORMAT (I4,4E16.8,4I9)                                            C9060
 1290 FORMAT (I4,4E16.8,5I9)                                            C9070
 1300 FORMAT (//3X,1HJ,5X,5HXW(J),11X,7HFUN8(J),9X,7HFUN9(J),9X,8HFUN10( C9080
     1J),10X,8HFUN11(J),8X,8HFUN12(J),9X,8HY2PRM(J)/)                   C9090
 1310 FORMAT (I4,7E16.8)                                                C9100
 1320 FORMAT (//3X,1HJ,4X,5HXW(J),5X,8HVLAM(JG),3X,8HVTAU(JG),2X,9HVLAMP C9110
     1(JG),2X,9HVTAUP(JG),5X,3HGAN,6X,6HDGANDX,5X,6HYV(JG),5X,6HZV(JG),6 C9120
     2X,4HR(J),6X,5HY2(J)/)                                             C9130
 1330 FORMAT (I4,11E11.3)                                               C9140
 1331 FORMAT(//3X,2HNA,4X,8HCOEF(NA)/)                                  C9141
 1332 FORMAT (I4,E16.8)                                                 C9142
 1333 FORMAT (//3X,1HJ,5X,5HXW(J),9X,9HFUNAO(JG),7X,9HFUNBO(JG),9X,8HUUO C9143
     1D(JG),7X,9HUU90D(JG)/)                                            C9144
 1334 FORMAT (I4,5E16.8)                                                C9145
 1340 FORMAT (//8H SIGMA =,E16.8//8H DELTA =,E16.8//9H BETASQ =,E16.8//7 C9150
     1H DXR = ,E16.8//8H DXSQR =,E16.8//8H GAMP1 =,E16.8//9H GP1DXR =,E1 C9160
     26.8//7H KMM1 =,I5//7H KFM1 =,I5//5H KF =,I5//9H DELETA =,E16.8//6H C9170
     3 PIR =,E16.8//8H CON4 = ,E16.8//7H CON5 =,E16.8//4H H =,E16.8//5H C9180
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     4JT =,I5//5H JI =,I5)                                                                                    C9190
1350 FORMAT (/9H JF      =,I5//9H DX      =,E16.8//9H JXN     =,I5//9H SNO                                C9200
    .1     =,E16.8//9H CS20    =,E16.8//9H SNALP  =,E16.8//9H IJW     =,I5/                               C9210
     2/9H JW10    =,I5//9H JW20    =,I5//9H JW1X    =,I5//9H JW3X    =,I5//9                            C9220
     3H BETA    =,E16.8//9H JW3M1  =,I5//9H DLTPH  =,E16.8//9H JCHCK  =,I                                  C9230
     45//9H IW      =,I5//9H JW10M2 =,I5)                                                                   C9240
1360 FORMAT (/9H JW3P1  =,I5//9H JW10M1 =,I5//9H M       =,I5//9H XWM                                      C9250
     1 =,E16.8//9H XWMSQR =,E16.8)                                                                           C9260
      END                                                                                                    C9270-
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```
      SUBROUTINE MACH                                                   M   0
C                                                                       M  10
      COMMON SIGMA,DELTA,I,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF,DE M  20
     1LETA,PIR,CON4,CON5,H,JT,JI,JF,DPHIMX,DX,JXN,SNO,CS20,SNALP,IJW,JW1 M  30
     2O,JW2O,JW1X,JW3X,BETA,JW3M1,DLTPH,JCHCK,IW,JW1OM2,JW3P1,JW1OM1,M,X M  40
     3WM,XWMSQR,PI,AK2,AX2,AK1,AX1,AX1O,CNX,NAMXP1,A1,A2,ZMACH,JMCK     M  50
      COMMON R(120),SPRIME(120),FUN(120),XW(120),Y1(120),Y2(120),FUN1(12 M  60
     1O),FUNO(120),IFUN(120),FUN2(120),FUN3(120),FUN4(120),IGUN(120),CP( M  70
     2120),FUNX(120),SLAS(120,6),CPO(120),KLOA(120),KUPA(120),FUN5(120), M  80
     3FUN6(120),FUN7(120),FUNY(120),CP1(120),CP2(120)                   M  90
      COMMON FUN8(120),FUN9(120),FUN10(120),FUN11(120),Y2PRM(120),FUN12( M 100
     1120),FUNA(120),FUNB(120)                                          M 110
      COMMON CON7(100),CON8(100),CON9(100),CON10(100),CON11(100),CON1(10 M 120
     1O),CON2(100),CON3(100),OMEGA(100),ABAR(100),BBAR(100),CBAR(100),DB M 130
     2AR(100),PHIO(100),RW(100),RWR(100),AXOCR(100),ACHK(100),PHIOLD(100 M 140
     3),BCHK(100)                                                       M 150
      COMMON PHIUO(25),OMEGAU(25),ACHKU(25),BBARU(25),CBARU(25),DBARU(25 M 160
     1),BCHKU(25),PHIOU(25)                                             M 170
      COMMON IFUM(50),VLAM(50),VTAU(50),VLAMP(50),VTAUP(50),YV(50),ZV(50 M 180
     1),FUNAO(50),FUNBO(50),UUOD(50),UU9OD(50)                          M 190
      COMMON PHI(109,50),PHIU(50,25),COEF(21)                           M 200
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH M 210
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1, M 220
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                   M 230
      DIMENSION ATHETA(19), ATAU(19), AXW(19), AY2B(19)                 M 231
      DIMENSION ARA(19,19), ARB(21), BRA(19,1), IPIVOT(19)              M 232
      JXOC=JW1O                                                         M 240
      ZMACH=BETASQ                                                      M 250
      MM=JW3                                                            M 260
      IF (AMINF.GE.1.) GO TO 210                                        M 270
C                                                                       M 280
C     PART 1   LAWRENCE AND FLAX APPROXIMATION                          M 290
C                FOR SUBSONIC FREE-STREAM MACH NUMBERS                  M 300
C                                                                       M 310
C                                                                       M 320
      XOC=XW(JXOC)                                                      M 321
      YPCHK=Y2PRM(JW1O)-DXR*(R(JW1O)-R(JW1O-1))                         M 322
      IF (ABS(YPCHK).GT.1.E-06) XOC=XOC-(Y2(JW1O)-R(JW1O))/YPCHK        M 330
      X1C=XW(JW3)                                                       M 350
      X1MXO=X1C-XOC                                                     M 360
      X1MXOR=1./X1MXO                                                   M 370
      GPI=0.                                                            M 380
      NAMAX=20
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      MAMAX=19                                                          M 390
      ANAMX=NAMAX                                                       M 400
      AMAMX=MAMAX                                                       M 410
      ANAMXR=1./ANAMX                                                   M 420
      AMAMXR=1./AMAMX                                                   M 430
      NAMXM1=NAMAX-1 $ MAMXM1=MAMAX-1 $ NAMXP1=NAMAX+1                  M 440
      ATHAMX=ACOS(X1MXOR*(2.*XW(JXOC)-XOC-X1C))                         M 441
      ATHAMX=ATHAMX*ANAMX/(ANAMX-1.)                                    M 442
      DO    10 NA=1,NAMXM1                                              M 450
      ANA=NA                                                            M 460
      ATHETA(NA)=ATHAMX*ANA*ANAMXR                                      M 470
   10 AXW(NA)=     .5*(X1C+XOC+X1MXO*COS(ATHETA(NA)))                   M 480
      DO    20 MA=1,MAMXM1                                              M 490
      AMA=MA                                                            M 500
   20 ATAU(MA)=PI*AMA*AMAMXR                                            M 510
      DO    70 NA=1,NAMXM1                                              M 520
      AX=AXW(NA)-XW(JW1)                                                M 530
      BX=AK2*(AX-AX2)                                                   M 540
      IF (BX.LT.-100.) BX=-100.                                         M 550
      IF (BX.GT.100.) BX=100.                                           M 560
      IF(ABS(BX).LT.1.E-06) GO TO 30                                    M 570
      CX=EXP(-BX)                                                       M 580
      XD=1./(1.-CX)                                                     M 590
      AY2B(NA)=-B2*(AX-AX2)*XD                                          M 600
      GO TO 40                                                          M 610
   30 AY2B(NA)=-B2/BX                                                   M 620
   40 IF(IWING.EQ.-2) GO TO 50                                          M 630
      AY2B(NA)=A2+B2*AX+AY2B(NA)                                        M 640
      GO TO 70                                                          M 650
   50 BX=AK1*(AX-AX1)                                                   M 660
      IF (BX.LT.-100.) BX=-100. $ IF (BX.GT.100.) BX=100.               M 680
      IF (ABS(BX).LT.1.E-06) GO TO 60                                   M 690
      CX=EXP(-BX) $ XD=1./(1.-CX)                                       M 700
      AY2B(NA)=AY2B(NA)+(B2-B1)*(AX-AX1)*XD+A1+B1*AX                    M 710
      GO TO 70                                                          M 720
   60 AY2B(NA)=AY2B(NA)+A1+B1*AX+(B2-B1)/BX                             M 730
   70 CONTINUE                                                          M 740
      J=JW3                                                             M 750
      DO   100 NA=1,NAMXM1                                              M 760
   80 IF (XW(J).LT.AXW(NA)) GO TO 90                                    M 770
      J=J-1                                                             M 780
      GO TO 80                                                          M 790
   90 AR=R(J)+(R(J+1)-R(J))*DXR*(AXW(NA)-XW(J))                         M 800
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100 AY2B(NA)=AY2B(NA)-AR**2/AY2B(NA)                                    M 810
    BETA=SQRT(BETASQ)                                                   M 830
    DO  110 NA=1,NAMXM1                                                 M 840
    CST=COS(ATHETA(NA))                                                 M 850
    BABR=2.*BETA*AY2B(NA)*X1MXOR                                        M 860
    BRA(NA,1)=(SQRT((1.-CST)**2+BABR**2)-BABR)/(1.-CST)                 M 870
    ARA(NA,MAMAX)=(BABR-SQRT((1.+CST)**2+BABR**2))/(1.+CST)             M 880
    DO  110 MA=1,MAMXM1                                                 M 890
    CSTU=COS(ATAU(MA))                                                  M 900
    ACK1=CSTU-CST $ ACK2=.01*BABR                                       M 910
    IF (BABR.LT.1.E-08) GO TO 102                                       M 911
    IF (ABS(ACK1).LT.ACK2) GO TO 101                                    M 912
    ARA(NA,MA)=(SQRT(ACK1**2+BABR**2)-BABR)/ACK1                        M 913
    GO TO 110                                                           M 914
101 ARA(NA,MA)=.5*ACK1/BABR*(1.-.25*(ACK1/BABR)**2)                     M 915
    GO TO 110                                                           M 916
102 ARA(NA,MA)=1.                                                       M 917
    IF (ACK1.LT.0.) ARA(NA,MA)=-1.                                      M 918
110 CONTINUE                                                            M 919
    DO  160 NA=1,NAMXM1                                                 M 920
    DO 130 LA=1,NAMXP1                                                  M 930
    ALA=LA                                                              M 940
    SUM=0.                                                              M 950
    DO  120 MA=1,MAMXM1                                                 M 960
120 SUM=SUM+COS(ATAU(MA)*(ALA-1.))*ARA(NA,MA)                           M 970
130 ARB(LA)=PI*AMAMXR*(.5*(BRA(NA,1)-(-1.)**LA*ARA(NA,MAMAX))+SUM)      M 980
    ARB(1)=2.*ATHETA(NA)+ARB(1)-3.*PI                                   M 990
    DO 140 LA=2,NAMXP1                                                  M1000
    ALA=LA                                                              M1010
    ALAM1=ALA-1.                                                        M1020
140 ARB(LA)=2.*SIN(ALAM1*ATHETA(NA))*(1./ALAM1+PI*BETA*AY2B(NA)*X1MXOR  M1030
   1/SIN(ATHETA(NA)))+ARB(LA)                                           M1040
    DO 150 LA=1,NAMXM1                                                  M1060
150 ARA(NA,LA)=ARB(LA+2)-ARB(LA)                                        M1070
160 BRA(NA,1)=3.*GPI+2.*PI*AY2B(NA)**2                                  M1080
    NL=NAMXM1                                                           M1090
    NRHS=1                                                              M1100
    IFAC=0                                                              M1110
    CALL SIMEQ (ARA,NL,BRA,NRHS,DETERM,IPIVOT,NAMXM1,ISCALE)
    IF (DETERM.NE.0.) GO TO 170                                         M1130
    STOP 201                                                            M1140
170 DO  180 NA=1,NAMXM1                                                 M1150
180 COEF(NA)=BRA(NA,1)                                                  M1160
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      COEF(NAMAX)=0.                                                    M1170
      COEF(NAMAX+1)=0.                                                  M1180
      DO 191 J=JXOC,JW3                                                 M1200
      Y2B=Y2(J)-R(J)**2/Y2(J)                                           M1210
      BTHETA=ACOS(X1MXOR*(2.*XW(J)-XOC-X1C))                            M1240
      CP1(J)=GPI+(PI-BTHETA)*COEF(1)-SIN(BTHETA)*COEF(2)                M1250
      DO 190 NA=3,NAMXP1                                                M1270
      NAM1=NA-1                                                         M1280
      ANAM1=NAM1                                                        M1290
      SINT=SIN(ANAM1*BTHETA)                                            M1300
  190 CP1(J)=CP1(J)+(COEF(NA-2)-COEF(NA))*SINT/ANAM1                    M1310
      FUNA(J)=2.*PIR*CP1(J)/Y2B**2                                      M1330
      JG=J-JW10+3                                                       M1341
      FUNA0(JG)=FUNA(J)                                                 M1342
  191 CP(J)=2.*PIR*CP1(J)/Y2B                                           M1343
      CHK0=3.*(FUNA(JW10+1)-FUNA(JW10+2))+FUNA(JW10+3)                  M1344
      IF (FUNA(JW10).LT.CHK0) GO TO 192                                 M1345
      FUNA(JW10)=CHK0                                                   M1346
      FUNA0(3)=CHK0                                                     M1347
      CP(JW10)=(Y2(JW10)-R(JW10)**2/Y2(JW10))*CHK0                      M1348
      CP1(JW10)=CHK0*(Y2(JW10)-R(JW10)**2/Y2(JW10))**2*.5*PI            M1349
  192 CP2(JXOC)=.5*DXR*(-3.*CP1(JXOC)+4.*CP1(JXOC+1)-CP1(JXOC+2))       M1350
      CP2(JW3)=0.                                                       M1351
      DO 200 J=JXOC,JW3                                                 M1352
      JG=J-JW10+3                                                       M1353
      FUNB(J)=.5*DXR*(FUNA(J+1)-FUNA(J-1))                              M1354
      Y2B=Y2(J)-R(J)**2/Y2(J)                                           M1355
      FUNB0(JG)=FUNB(J)                                                 M1356
      IF (J.NE.JXOC.AND.J.NE.JW3) CP2(J)=.5*DXR*(CP1(J+1)-CP1(J-1))     M1357
      Y2BOP=PIR*CP2(J)/Y2B                                              M1358
      UU0D(JG)=Y2BOP*SNALP                                              M1359
  200 UU90D(JG)=((1.-(R(J)/Y2(J))**2)*Y2BOP+2.*PIR*SPRIME(J)/Y2(J))/(1.+ M1360
     1(R(J)/Y2(J))**2)*SNALP                                            M1361
      FUNB(JW10)=.5*DXR*(-3.*FUNA(JW10)+4.*FUNA(JW10+1)-FUNA(JW10+2))   M1362
      FUNB(JW3)=.5*DXR*(3.*FUNA(JW3)-4.*FUNA(JW3-1)+FUNA(JW3-2))        M1363
      FUNB0(3)=FUNB(JW10) $ FUNB0(JW3-JW10+3)=FUNB(JW3)                 M1364
      GO TO 390                                                         M1365
C                                                                       M1366
C     PART 2   CARAFOLI APPROXIMATION                                   M1370
C                FOR SUPERSONIC FREE-STREAM MACH NUMBERS                M1380
C                                                                       M1390
  210 BETA=SQRT(-BETASQ)                                                M1400
      BBBP=BETA*B2                                                      M1410
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      IF (BBBP.GT.1.) RETURN                                                    M1420
      CHCK=.5*DXR*HSPAN*BETA                                                    M1430
      IF (CHCK.GT.1.) GO TO 220                                                 M1440
      JMCK=JW3                                                                  M1450
      GO TO 270                                                                 M1460
  220 JMCK=JXOC+1                                                               M1470
      JXOCP2=JXOC+2                                                             M1480
      DO 230 J=JXOCP2,JW3                                                       M1490
      IF (Y2PRM(J).LT.Y2PRM(J+1)) GO TO 230                                     M1500
      CHCK=Y2PRM(J)/B2                                                          M1510
      IF (CHCK.LT..999) GO TO 240                                               M1520
  230 JMCK=J                                                                    M1530
  240 AX20=XW(JW1)+AX2                                                          M1540
      DO  250 J=JXOC,JW3                                                        M1550
      IF (XW(J).GT.AX20) GO TO 260                                              M1560
  250 MM=J                                                                      M1570
  260 JMP1=MM+1                                                                 M1580
      HSPNB=HSPAN-R(JMP1)**2/HSPAN                                              M1590
  270 NAMAX=20                                                                  M1591
      ANAMX=NAMAX                                                               M1592
      ANAMXR=1./ANAMX                                                           M1593
      PHIO(NAMAX+1)=0.                                                          M1594
      NAMXP1=NAMAX+1                                                            M1595
      DO 271 NA=1,NAMAX                                                         M1596
      ANA=NA                                                                    M1597
  271 PHIO(NA)=SQRT(1.-((ANA-1.)*ANAMXR)**2)                                    M1598
      SUM=0.                                                                    M1599
      DO 272 NA=1,NAMAX                                                         M1600
  272 SUM=SUM+2.*PIR*ANAMXR*(PHIO(NA)+PHIO(NA+1))                               M1601
      DO 280 J=JW10,JMCK                                                        M1602
      ARGO=BETA*Y2PRM(J)                                                        M1603
      IF (ARGO.LT.1.) ARG=1.-SQRT(1.-ARGO**2)                                   M1604
      IF (ARGO.GE.1.) ARG=1.                                                    M1610
      ANUM3=0. $ IF (ARG.GT.1.E-06) ANUM3=ARG*ALOG(ARG)                         M1620
      EC=1.+.4630151*ARG+.1077812*ARG**2-(.2452727+.0412496*ARG)*ANUM3          M1630
      FUNA(J)=1./EC                                                             M1631
      JG=J-JW10+3                                                               M1632
      FUNAO(JG)=SUM/EC                                                          M1633
      FUNBO(JG)=DXR*(FUNAO(JG)-FUNAO(JG-1))                                     M1634
      FUNA(J)=1./EC                                                             M1640
  280 FUNB(J)=DXR*(FUNA(J)-FUNA(J-1))                                           M1650
      FUNB(JW10)=FUNB(JW10+1)                                                   M166
      FUNBO(3)=FUNBO(4)                                                         M166
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      IF (JMCK.EQ.JW3) GO TO 390                                          M1670
      JMCKP1=JMCK+1                                                       M1690
      HSPNBP=Y2PRM(JMCKP1)*(1.+(R(JMCKP1)/Y2(JMCKP1))**2)-PIR*SPRIME(JMC  M1700
     1KP1)/Y2(JMCKP1)                                                     M1701
      XWOO=XW(JMCKP1)-(Y2(JMCKP1)-R(JMCKP1)**2/Y2(JMCKP1))/HSPNBP         M1710
      ANUM1=1./(1.+BETA*HSPNBP)                                           M1720
      XUO=XWOO+(XW(JMCKP1)-XWOO)*ANUM1                                    M1730
      DO  290 J=JXOC,JMP1                                                 M1740
      IF (XUO.LT.XW(J)) GO TO 300                                         M1750
  290 JXUO=J                                                              M1760
  300 DO 380 J=JMCKP1,JW3                                                 M1770
      Y2B=Y2(J)-R(J)**2/Y2(J)                                             M1810
      DYB =Y2B*ANAMXR                                                     M1820
      YB=-DYB                                                             M1830
      XU1=XWOO+(XW(J)-XWOO)*ANUM1                                         M1840
      IF (J.LE. MM) GO TO 310                                             M1850
      YU1=(XU1-XWOO)*HSPNBP                                               M1860
      IF (YU1.LE.HSPNB) GO TO 310                                         M1870
      XU1=XW(J)-BETA*HSPNB                                                M1880
  310 IF (XU1.GE.XW(JXUO+1)) JXUO=JXUO+1                                  M1890
      IF (XU1.GE.XW(JXUO+1)) GO TO 310                                    M1891
      JXU1=JXUO                                                           M1900
      JXU2=JXU1                                                           M1910
      XU2=XU1                                                             M1920
      DO 360 NA=1,NAMXP1                                                  M1930
      YB=YB+DYB                                                           M1940
      IF (NA.EQ.1) GO TO 320                                              M1941
      XU1=XU1+BETA*DYB*ANUM1                                              M1950
      IF (J.LE. MM) GO TO 320                                             M1960
      YU1=(XU1-XWOO)*HSPNB                                                M1970
      IF (YU1.LE.HSPNB) GO TO 320                                         M1980
      XU1=XU1+BETA*DYB*(1.-ANUM1)                                         M1990
  320 IF (XU1.GE.XW(JXU1+1)) JXU1=JXU1+1                                  M2000
      IF (XU1.GE.XW(JXU1+1)) GO TO 320                                    M2001
      IF (JXU1.LT.JW10) GO TO 321                                         M2002
      ABC2=(XU1-XW(JXU1))*DXR                                             M2010
      ABC1=1.-ABC2                                                        M2011
      YUP=(1.+(R(JXU1)/Y2(JXU1))**2)*Y2PRM(JXU1)-PIR*SPRIME(JXU1)/Y2(JXU  M2012
     11)                                                                  M2013
      YUP1=(1.+(R(JXU1+1)/Y2(JXU1+1))**2)*Y2PRM(JXU1+1)-PIR*SPRIME(JXU1+  M2014
     11)/Y2(JXU1+1)                                                       M2015
      ALAM10=ABC1*YUP+ABC2*YUP1                                           M2016
      ALAM1=ABC1*Y2PRM(JXU1)+ABC2*Y2PRM(JXU1+1)                           M2017
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      YUB=Y2(JXU1)-R(JXU1)**2/Y2(JXU1)                                    M2020
      YUB1=Y2(JXU1+1)-R(JXU1+1)**2/Y2(JXU1+1)                             M2021
      YUC1=ABC1*YUB+ABC2*YUB1                                             M2022
  321 IF (JXU1.LT.JMCKP1) YUC1=(XU1-XW00)*HSPNBP                          M2023
      IF (JXU1.LT.JMCKP1) ALAM10=HSPNBP                                   M2024
      IF (JXU1.LT.JMCKP1) ALAM1=Y2PRM(JMCKP1)                             M2025
      AB1=YUC1+(XW(J)-XU1)*ALAM10                                         M2026
      IF (NA.EQ.1) GO TO 330                                              M2027
      XU2=XU2-BETA*DYB*ANUM1                                              M2030
      IF (J.LE. MM) GO TO 330                                             M2040
      YU2=(XU2-XW00)*HSPNBP                                               M2050
      IF (YU2.LE.HSPNB) GO TO 330                                         M2060
      XU2=XU2-BETA*DYB*(1.-ANUM1)                                         M2070
  330 IF (XU2.LT.XW(JXU2)) JXU2=JXU2-1                                    M2080
      IF (XU2.LT.XW(JXU2)) GO TO 330                                      M2081
      IF (JXU2.LT.JW10) GO TO 331                                         M2082
      ABC2=(XU2-XW(JXU2))*DXR                                             M2090
      ABC1=1.-ABC2                                                        M2091
      YUP=(1.+(R(JXU2)/Y2(JXU2))**2)*Y2PRM(JXU2)-PIR*SPRIME(JXU2)/Y2(JXU  M2092
     12)                                                                  M2093
      YUP1=(1.+(R(JXU2+1)/Y2(JXU2+1))**2)*Y2PRM(JXU2+1)-PIR*SPRIME(JXU2+  M2094
     11)/Y2(JXU2+1)                                                       M2095
      ALAM20=ABC1*YUP+ABC2*YUP1                                           M2096
      ALAM2=ABC1*Y2PRM(JXU2)+ABC2*Y2PRM(JXU2+1)                           M2097
      YUB=Y2(JXU2)-R(JXU2)**2/Y2(JXU2)                                    M2100
      YUB1=Y2(JXU2+1)-R(JXU2+1)**2/Y2(JXU2+1)                             M2101
      YUC2=ABC1*YUB+ABC2*YUB1                                             M2102
  331 IF (JXU2.LT.JMCKP1) YUC2=(XU2-XW00)*HSPNBP                          M2103
      IF (JXU2.LT.JMCKP1) ALAM20=HSPNBP                                   M2104
      IF (JXU2.LT.JMCKP1) ALAM2=Y2PRM(JMCKP1)                             M2105
      AB2=YUC2+(XW(J)-XU2)*ALAM20                                         M2106
      IF (ALAM2.GT.1.E-06) GO TO 340                                      M2110
      CB1=AB1 $ CB2=AB2                                                   M2120
      GO TO 350                                                           M2130
  340 DELB=.5*(YUC1-ALAM10*XU1-YUC2+ALAM20*XU2+(ALAM10-ALAM20)*XW(J))     M2140
      CB1=AB1-DELB  $ CB2=AB2+DELB                                        M2150
  350 ANUM2=SQRT(2.*CB1/(CB1+CB2))                                        M2160
      ARGO=.5*BETA*(ALAM1+ALAM2)                                          M2161
      IF (ARGO.LT.1.) ARG=1.-SQRT(1.-ARGO**2)                             M2162
      IF (ARGO.GE.1.) ARG=1.                                              M2163
      ANUM3=0. $ IF (ARG.GT.1.E-06) ANUM3=ARG*ALOG(ARG)                   M2170
      EC=1.+.4630151*ARG+.1077812*ARG**2-(.2452727+.0412496*ARG)*ANUM3    M2180
      IF (NA.EQ.NAMXP1) GO TO 361                                         M2181
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      IF (NA.EQ.1) SAVC=ANUM2/EC*SQRT(AB1*AB2+4.*R(J)**2)                    M2182
      IF (NA.EQ.1.AND.J.EQ.JMCKP1) SAVA=(XW(JMCK)-XW00)*HSPNBP/EC            M2183
      IF (NA.EQ.1.AND.J.EQ.JMCKP1) SAVB=SQRT(SAVA**2+4.*(R(JMCK)/EC)**2)     M2184
  360 PHIO(NA)=ANUM2/EC*SQRT((AB1-YB)*(AB2+YB))                              M2190
  361 FUNA(J)=SQRT((AB1+AB2)/AB1*CB1/(CB1+CB2))/EC                           M2191
      SUM=0.                                                                 M2200
      DO  370 NA=1,NAMAX                                                     M2210
  370 SUM=SUM+DYB*(PHIO(NA)+PHIO(NA+1))                                      M2220
      JG=J-JW10+3                                                            M2230
      FUNAO(JG)=2.*SUM/(PI*Y28**2)                                           M2231
      FUNBO(JG)=DXR*(FUNAO(JG)-FUNAO(JG-1))                                  M2232
      UUOD(JG)=DXR*(PHIO(1)-SAVA)*SNALP                                      M2233
      UU90D(JG)=DXR*(SAVC-SAVB)*SNALP                                        M2234
      SAVA=PHIO(1) $ SAVB=SAVC                                               M2235
  380 FUNB(J)=DXR*(FUNA(J)-FUNA(J-1))                                        M2240
C                                                                            M2250
C     PART 3   CORRECTION OF FUNCTIONS                                       M2260
C                                                                            M2270
  390 DO  420 J=JW10,JW3                                                     M2280
      JG=J-JW10+3                                                            M2281
      IF (J.GT.JW10) GO TO 400                                               M2290
      FUNBP=DXR*(FUNBO(4)-FUNBO(3))                                          M2300
      GO TO 410                                                              M2310
  400 FUNBP=DXR*(FUNBO(JG)-FUNBO(JG-1))                                      M2320
  410 FUNO(J)=FUNAO(JG)*FUNO(J)+FUNBO(JG)*FUN2(J)+.5*FUNBP*FUN3(J)           M2330
      FUN2(J)=FUNAO(JG)*FUN2(J)+FUNBO(JG)*FUN3(J)                            M2340
      FUN3(J)=FUNAO(JG)*FUN3(J)                                              M2350
      FUN(J)=GAMP1*FUN2(J)*FUNO(J)                                           M2360
  420 FUN4(J)=FUNAO(JG)*FUN4(J)+CNX*FUNBO(JG)*Y2(J)*SNALP                    M2370
      RETURN                                                                 M2380
      END                                                                    M2390
```

```
      SUBROUTINE SIMEQ(A,N,B,M,DETERM,IPIVOT,NMAX,ISCALE)                F4.1    1
********* DOCUMENT DATE 08-01-68    SUBROUTINE REVISED 08-01-68 *********F4.1    2
C     SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS                          F4.1    3
C                                                                        F4.1    4
      DIMENSION IPIVOT(N),A(NMAX,N),B(NMAX,M)                            F4.1    5
      EQUIVALENCE (IROW,JROW),(ICOLUM,JCOLUM),(AMAX,T,SWAP)              F4.1    6
C                                                                        F4.1    7
C     INITIALIZATION                                                     F4.1    8
C                                                                        F4.1    9
    5 ISCALE=0                                                           F4.1   10
    6 R1=10.0**100                                                       F4.1   11
    7 R2=1.0/R1                                                          F4.1   12
   10 DETERM=1.0                                                         F4.1   13
   15 DO 20 J=1,N                                                        F4.1   14
   20 IPIVOT(J)=0                                                        F4.1   15
   30 DO 550 I=1,N                                                       F4.1   16
C                                                                        F4.1   17
C     SEARCH FOR PIVOT ELEMENT                                           F4.1   18
C                                                                        F4.1   19
   40 AMAX=0.0                                                           F4.1   20
   45 DO 105 J=1,N                                                       F4.1   21
   50 IF (IPIVOT(J)-1) 60,105,60                                         F4.1   22
   60 DO 100 K=1,N                                                       F4.1   23
   70 IF (IPIVOT(K)-1) 80,100,740                                        F4.1   24
   80 IF (ABS(AMAX)-ABS(A(J,K))) 85,100,100                              F4.1   25
   85 IROW=J                                                             F4.1   26
   90 ICOLUM=K                                                           F4.1   27
   95 AMAX=A(J,K)                                                        F4.1   28
  100 CONTINUE                                                           F4.1   29
  105 CONTINUE                                                           F4.1   30
      IF (AMAX) 110,106,110                                              F4.1   31
  106 DETERM=0.0                                                         F4.1   32
      ISCALE=0                                                           F4.1   33
      GO TO 740                                                          F4.1   34
  110 IPIVOT(ICOLUM)=IPIVOT(ICOLUM)+1                                    F4.1   35
C                                                                        F4.1   36
C     INTERCHANGE ROWS TO PUT PIVOT ELEMENT ON DIAGONAL                  F4.1   37
C                                                                        F4.1   38
  130 IF (IROW-ICOLUM) 140,260,140                                       F4.1   39
  140 DETERM=-DETERM                                                     F4.1   40
  150 DO 200 L=1,N                                                       F4.1   41
  160 SWAP=A(IROW,L)                                                     F4.1   42
```

```
  170 A(IROW,L)=A(ICOLUM,L)                                          F4.1  43
  200 A(ICOLUM,L)=SWAP                                               F4.1  44
  205 IF (M) 260,260,210                                             F4.1  45
  210 DO 250 L=1,M                                                   F4.1  46
  220 SWAP=B(IROW,L)                                                 F4.1  47
  230 B(IROW,L)=B(ICOLUM,L)                                          F4.1  48
  250 B(ICOLUM,L)=SWAP                                               F4.1  49
  260 PIVOT=A(ICOLUM,ICOLUM)                                         F4.1  50
      IF (PIVOT) 1000,106,1000                                       F4.1  51
C                                                                    F4.1  52
C     SCALE THE DETERMINANT                                          F4.1  53
C                                                                    F4.1  54
 1000 PIVOTI=PIVOT                                                   F4.1  55
 1005 IF(ABS(DETERM)-R1)1030,1010,1010                               F4.1  56
 1010 DETERM=DETERM/R1                                               F4.1  57
      ISCALE=ISCALE+1                                                F4.1  58
      IF(ABS(DETERM)-R1)1060,1020,1020                               F4.1  59
 1020 DETERM=DETERM/R1                                               F4.1  60
      ISCALE=ISCALE+1                                                F4.1  61
      GO TO 1060                                                     F4.1  62
 1030 IF(ABS(DETERM)-R2)1040,1040,1060                               F4.1  63
 1040 DETERM=DETERM*R1                                               F4.1  64
      ISCALE=ISCALE-1                                                F4.1  65
      IF(ABS(DETERM)-R2)1050,1050,1060                               F4.1  66
 1050 DETERM=DETERM*R1                                               F4.1  67
      ISCALE=ISCALE-1                                                F4.1  68
 1060 IF(ABS(PIVOTI)-R1)1090,1070,1070                               F4.1  69
 1070 PIVOTI=PIVOTI/R1                                               F4.1  70
      ISCALE=ISCALE+1                                                F4.1  71
      IF(ABS(PIVOTI)-R1)320,1080,1080                                F4.1  72
 1080 PIVOTI=PIVOTI/R1                                               F4.1  73
      ISCALE=ISCALE+1                                                F4.1  74
      GO TO 320                                                      F4.1  75
 1090 IF(ABS(PIVOTI)-R2)2000,2000,320                                F4.1  76
 2000 PIVOTI=PIVOTI*R1                                               F4.1  77
      ISCALE=ISCALE-1                                                F4.1  78
      IF(ABS(PIVOTI)-R2)2010,2010,320                                F4.1  79
 2010 PIVOTI=PIVOTI*R1                                               F4.1  80
      ISCALE=ISCALE-1                                                F4.1  81
  320 DETERM=DETERM*PIVOTI                                           F4.1  82
C                                                                    F4.1  83
C     DIVIDE PIVOT ROW BY PIVOT ELEMENT                              F4.1  84
C                                                                    F4.1  85
```

```
  340 DO 351 L=1,N                                                    F4.1  86
  341 IF (IPIVOT(L)-1) 350,351,740                                    F4.1  87
  350 A(ICOLUM,L)=A(ICOLUM,L)/PIVOT                                   F4.1  88
  351 CONTINUE                                                        F4.1  89
  355 IF (M) 380,380,360                                              F4.1  90
  360 DO 370 L=1,M                                                    F4.1  91
  370 B(ICOLUM,L)=B(ICOLUM,L)/PIVOT                                   F4.1  92
C                                                                     F4.1  93
C     REDUCE NON-PIVOT ROWS                                         F4.1  94
C                                                                     F4.1  95
  380 DO 550 L1=1,N                                                   F4.1  96
  390 IF (L1-ICOLUM) 400,550,400                                      F4.1  97
  400 T=A(L1,ICOLUM)                                                  F4.1  98
  430 DO 451 L=1,N                                                    F4.1  99
  431 IF (IPIVOT(L)-1) 450,451,740                                    F4.1 100
  450 A(L1,L)=A(L1,L)-A(ICOLUM,L)*T                                   F4.1 101
  451 CONTINUE                                                        F4.1 102
  455 IF (M) 550,550,460                                              F4.1 103
  460 DO 500 L=1,M                                                    F4.1 104
  500 B(L1,L)=B(L1,L)-B(ICOLUM,L)*T                                   F4.1 105
  550 CONTINUE                                                        F4.1 106
  740 RETURN                                                          F4.1 107
      END                                                             F4.1 108
```

```
      OVERLAY (DICK,1,2)                                                D    0
      PROGRAM WORK                                                      D   10
      COMMON SIGMA,DELTA,I,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF,DE  D   20
     1LETA,PIR,CON4,CON5,H,JT,JI,JF,DPHIMX,DX,JXN,SNO,CS2O,SNALP,IJW,JW1  D   30
     2O,JW2C,JW1X,JW3X,BETA,JW3M1,DLTPH,JCHCK,IW,JW1OM2,JW3P1,JW1CM1,M,X  D   40
     3WM,XWMSQR,PI,AK2,AX2,AK1,AX1,AX10,CNX,NAMXP1,A1,A2,ZMACH,JMCK      D   50
      COMMON R(120),SPRIME(120),FUN(120),XW(120),Y1(120),Y2(120),FUN1(12  D   60
     10),FUNO(120),IFUN(120),FUN2(120),FUN3(120),FUN4(120),IGUN(120),CP(  D   70
     22120),FUNX(120),SLAS(120,6),CPO(120),KLOA(120),KUPA(120),FUN5(120),  D   80
     3FUN6(120),FUN7(120),FUNY(120),CP1(120),CP2(120)                   D   90
      COMMON FUN8(120),FUN9(120),FUN10(120),FUN11(120),Y2PRM(120),FUN12(  D  100
     1120),FUNA(120),FUNB(120)                                          D  110
      COMMON CON7(100),CON8(100),CON9(100),CON10(100),CON11(100),CON1(10  D  120
     10),CON2(100),CON3(100),OMEGA(100),ABAR(100),BBAR(100),CBAR(100),DB  D  130
     2AR(100),PHIO(100),RW(100),RWR(100),AXOCR(100),ACHK(100),PHIOLD(100  D  140
     3),BCHK(100)                                                       D  150
      COMMON PHIUO(25),OMEGAU(25),ACHKU(25),BBARU(25),CBARU(25),DBARU(25  D  160
     1),BCHKU(25),PHIOU(25)                                             D  170
      COMMON IFUM(50),VLAM(50),VTAU(50),VLAMP(50),VTAUP(50),YV(50),ZV(50  D  180
     1),FUNAO(50),FUNBO(50),UUOD(50),UU90D(50)                          D  190
      COMMON PHI(109,50),PHIU(50,25),COEF(21)                           D  200
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH  D  210
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1,  D  220
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                   D  230
      PRINT 810                                                         D  240
      PRINT 820                                                         D  250
      PRINT 830                                                         D  260
      PRINT 840                                                         D  270
      SUPP=1.                                                           D  280
10    I=I+1                                                             D  290
      JIM1=JI-1                                                         D  300
      DO 20 K=1,KF                                                      D  310
      PHIOLD(K)=PHI(JIM1,K)                                             D  320
20    ACHK(K)=BETASQ                                                    D  330
      DPHIMX=0.                                                         D  340
      DO 780 J=JI,JF                                                    D  350
      JP1=J+1                                                           D  360
      JM1=J-1                                                           D  370
      JM2=J-2                                                           D  380
      JM3=J-3                                                           D  390
      JG=J-JW10+3                                                       D  400
      IF (J.LT.J1) GO TO 290                                            D  410
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      IF (J.GT.J4) GO TO 290                                                    D 420
                                                                                D 430
C                                                                               D 440
C     PART 1   PRIMARY B AND D ARRAYS IN INNER REGION                           D 450
C                                                                               D 460
      IFUNJ=IFUN(J)                                                             D 470
      IFNJP1=IFUNJ+1                                                            D 480
      KGUN=IGUN(J)                                                              D 490
      KGUNP1=KGUN+1                                                             D 500
      KLO=1                                                                     D 510
      KUP=KGUN-1                                                                D 520
      PHIM1=PHI(JM1,1)                                                          D 530
      PHIM10=PHIOLD(1)                                                          D 540
   30 DO 120 K=KLO,KUP                                                          D 550
      IF (K.LE.IFUNJ) GO TO 40                                                  D 560
      U=FUN2(J)*RWR(K)+FUN6(J)                                                  D 570
      IWO=0                                                                     D 580
      IF ((IW.EQ.1.AND.K.LE.IFUN(JP1)) IWO=1                                    D 590
      GO TO 50                                                                  D 600
   40 U=FUN4(J)                                                                 D 610
      IWO=0                                                                     D 620
   50 ALAMB=BETASQ-.5*GP1DXR*(PHI(JP1,K)-PHIM10)-GAMP1*U                        D 630
      IF (IWO.EQ.1) ALAMB=ALAMB+.25*GP1DXR*(PHI(JP1,K)-PHIU(JG+1,K))            D 640
      IF (ALAMB.LT.0.) GO TO 80                                                 D 650
      OMEGA(K)=SUB                                                              D 660
      ACHECK=ACHK(K)                                                            D 670
      ACHK(K)=ALAMB                                                             D 680
      BCHK(K)=ACHK(K)-ZMACH                                                     D 690
      BBAR(K)=-2.*DXSQR*ALAMB                                                   D 700
      DBAR(K)=ALAMB*DXSQR*(PHI(JP1,K)+PHIM1)                                    D 710
      IF (IWO.EQ.1) DBAR(K)=DBAR(K)+.5*ALAMB*DXSQR*(PHIU(JG+1,K)-PHI(JP1        D 720
     1,K))                                                                      D 730
      IF (ACHECK.GT.0.) GO TO 110                                               D 740
      IF (IGUN(JM2).LT.K) GO TO 60                                              D 750
      PHIM2=PHI(JM2,K)                                                          D 760
      GO TO 70                                                                  D 770
   60 PHIM2=PHI(JM2,K)-RWR(K)*FUN3(JM2)-FUNX(JM2)                               D 780
   70 BBAR(K)=BBAR(K)+ACHECK*DXSQR                                              D 790
      DBAR(K)=DBAR(K)+ACHECK*DXSQR*(-2.*PHIM1+PHIM2)                            D 780
      BCHK(K)=BCHK(K)+ACHECK-ZMACH                                              D 810
      OMEGA(K)=1.                                                               D 820
      GO TO 110                                                                 D 830
   80 OMEGA(K)=1.                                                               D 840
      IF (IGUN(JM2).LT.K) GO TO 90
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      PHIM2=PHI(JM2,K)                                                  D 850
      GO TO 100                                                         D 860
   90 PHIM2=PHI(JM2,K)-RWR(K)*FUN3(JM2)-FUNX(JM2)                       D 870
  100 SAVE=ALAMB                                                        D 880
      ALAMB=BETASQ-GP1DXR*(PHI(J,K)-PHIM10)-GAMP1*U                     D 890
      IF (ALAMB.GT.0.) ALAMB=0.                                         D 900
      IF (ACHK(K).GT.0.) OMEGA(K)=SUPP                                  D 910
      ACHK(K)=SAVE                                                      D 920
      BCHK(K)=ALAMB-ZMACH                                               D 930
      BBAR(K)=DXSQR*ALAMB                                               D 940
      DBAR(K)=DXSQR*ALAMB*(-2.*PHIM1+PHIM2)                             D 950
  110 PHIM1=PHI(JM1,K+1)                                                D 960
      PHIM10=PHIOLD(K+1)                                                D 970
      IF (IGUN(JM1).GT.K) GO TO 120                                     D 980
      PHIM1=PHIM1-RWR(K+1)*FUN3(JM1)-FUNX(JM1)                          D 990
      PHIM10=PHIM10-RWR(K+1)*FUN3(JM1)-FUNX(JM1)                        D1000
  120 CONTINUE                                                          D1010
      IF (KLO.NE.1) GO TO 130                                           D1020
      KLO=KGUN                                                          D1030
      KUP=KGUN                                                          D1040
      GO TO 30                                                          D1050
  130 IF (IW.EQ.0) GO TO 210                                            D1060
C                                                                       D1070
C     PART 2   B AND D ARRAYS BENEATH WING                              D1080
C                                                                       D1090
      IF (J.LT.JW10.OR.J.GT.JW3) GO TO 190                              D1100
      IFUMJ=IFUM(JG)                                                    D1110
      JGM1=JG-1                                                         D1120
      JGP1=JG+1                                                         D1130
      JGM2=JG-2                                                         D1140
      IFNJP2=IFUN(J+2)                                                  D1150
      IF (J.GT.JW10) GO TO 150                                          D1160
      DO 140 K=IFUMJ,IFNJP2                                             D1170
      PHIU(1,K)=PHI(JW10M2,K)                                           D1180
  140 PHIU(2,K)=PHI(JW10M1,K)                                           D1190
      GO TO 161                                                         D1200
  150 IFNO1=IFUN(JM1)+1                                                 D1210
      IFNO2=IFUN(JP1)                                                   D1220
      DO 160 K=IFNO1,IFNO2                                              D1221
  160 PHIU(JGM1,K)=PHI(JM1,K)                                           D1222
  161 U=-FUN4(J)-2.*FUNO(J)                                             D1223
      DO 180 K=IFUMJ,IFUNJ                                              D1230
      ALAMBU=BETASQ-.5*GP1DXR*(PHIU(JGP1,K)-PHIUO(K))-GAMP1*U           D1240
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```
      IF (ALAMBU.LT.0.) GO TO 170                                          D1250
      OMEGAU(K)=SUB                                                        D1260
      ACHECK=ACHKU(K)                                                      D1270
      ACHKU(K)=ALAMBU                                                      D1280
      BCHKU(K)=ALAMBU-ZMACH                                                D1290
      BBARU(K)=-2.*DXSQR*ALAMBU                                            D1300
      DBARU(K)=ALAMBU*DXSQR*(PHIU(JGP1,K)+PHIU(JGM1,K))                    D1310
      IF (ACHECK.GT.0.) GO TO 180                                          D1320
      BBARU(K)=BBARU(K)+ACHECK*DXSQR                                       D1330
      DBARU(K)=DBARU(K)+ACHECK*DXSQR*(-2.*PHIU(JGM1,K)+PHIU(JGM2,K))       D1340
      BCHKU(K)=ALAMBU+ACHECK-2.*ZMACH                                      D1350
      OMEGAU(K)=1.                                                         D1360
      GO TO 180                                                            D1370
  170 OMEGAU(K)=1.                                                         D1380
      SAVE=ALAMBU                                                          D1390
      ALAMBU=BETASQ-GP1DXR*(PHIU(JG,K)-PHIUO(K))-GAMP1*U                   D1400
      IF (ALAMBU.GT.0.) ALAMBU=0.                                          D1410
      IF (ACHKU(K).GT.0.) OMEGAU(K)=SUPP                                   D1420
      ACHKU(K)=SAVE                                                        D1430
      BCHKU(K)=ALAMBU-ZMACH                                                D1440
      BBARU(K)=DXSQR*ALAMBU                                                D1450
      DBARU(K)=DXSQR*ALAMBU*(-2.*PHIU(JGM1,K)+PHIU(JGM2,K))                D1460
  180 CONTINUE                                                             D1470
  190 IF (J.NE.JW1OM1) GO TO 210                                           D1480
      KUO=IFUN(JW1O+1)                                                     D1490
      DO 200 K=1,KUO                                                       D1500
      ACHKU(K)=ACHK(K)                                                     D1510
      BCHKU(K)=BCHK(K)                                                     D1520
  200 PHIUO(K)=PHI(JW1OM1,K)                                               D1530
C                                                                          D1540
C     PART 3   B AND D ARRAYS IN OUTER REGION                              D1550
C                                                                          D1560
C                                                                          D1570
  210 IF (IGUM(JP1).LT.KGUNP1) GO TO 220                                   D1580
      PHIP1=PHI(JP1,KGUNP1)+RWR(KGUNP1)*FUN3(JP1)+FUNX(JP1)                D1590
      GO TO 230                                                            D1600
  220 PHIP1=PHI(JP1,KGUNP1)                                                D1610
  230 DO 260 K=KGUNP1,KMM1                                                 D1620
      ALAMB=BETASQ-.5*GP1DXR*(PHIP1-PHIOLD(K))                             D1630
      IF (ALAMB.LT.0.) GO TO 240                                           D1640
      OMEGA(K)=SUB                                                         D1650
      ACHECK=ACHK(K)                                                       D1660
      ACHK(K)=ALAMB                                                        D1680
      BBAR(K)=-2.*DXSQR*ALAMB
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```
      DBAR(K)=ALAMB*DXSQR*(PHIP1+PHI(JM1,K))                                D1690
      IF (ACHECK.GT.0.) GO TO 250                                           D1700
      BBAR(K)=BBAR(K)+ACHECK*DXSQR                                          D1710
      DBAR(K)=DBAR(K)+ACHECK*DXSQR*(-2.*PHI(JM1,K)+PHI(JM2,K))              D1720
      OMEGA(K)=1.                                                           D1740
      GO TO 250                                                             D1750
  240 OMEGA(K)=1.                                                           D1760
      SAVE=ALAMB                                                            D1770
      ALAMB=BETASQ-GP1DXR*(PHI(J,K)-PHIOLD(K))                              D1780
      IF (ALAMB.GT.0.) ALAMB=0.                                             D1790
      IF (ACHK(K).GT.0.) OMEGA(K)=SUPP                                      D1800
      ACHK(K)=SAVE                                                          D1810
      BBAR(K)=DXSQR*ALAMB                                                   D1830
      DBAR(K)=DXSQR*ALAMB*(-2.*PHI(JM1,K)+PHI(JM2,K))                       D1840
  250 PHIP1=PHI(JP1,K+1)                                                    D1850
      IF (IGUN(JP1).LE.K) GO TO 260                                         D1860
      PHIP1=PHIP1+RWR(K+1)*FUN3(JP1)+FUNX(JP1)                              D1870
  260 CONTINUE                                                              D1880
                                                                            D1890
C                                                                           D1900
C     PART 4   B AND D ARRAYS AT OUTER WALL                                 D1910
C                                                                           D1920
      IF (IWALL.EQ.0) GO TO 280                                             D1930
      ALAMB=BETASQ-.5*GP1DXR*(PHIP1-PHIOLD(KM))                             D1940
      IF (ALAMB.LT.0.) GO TO 270                                            D1950
      OMEGA(KM)=SUB                                                         D1960
      ACHECK=ACHK(KM)                                                       D1970
      ACHK(KM)=ALAMB                                                        D1990
      BBAR(KM)=-2.*DXSQR*ALAMB                                              D2000
      DBAR(KM)=ALAMB*DXSQR*(PHIP1+PHI(JM1,KM))                              D2010
      IF (ACHECK.GT.0.) GO TO 280                                           D2020
      BBAR(KM)=BBAR(KM)+ACHECK*DXSQR                                        D2030
      DBAR(KM)=DBAR(KM)+ACHECK*DXSQR*(-2.*PHI(JM1,KM)+PHI(JM2,KM))          D2050
      OMEGA(KM)=1.                                                          D2060
      GO TO 280                                                             D2070
  270 OMEGA(KM)=1.                                                          D2080
      SAVE=ALAMB                                                            D2090
      ALAMB=BETASQ-GP1DXR*(PHI(J,KM)-PHIOLD(KM))                            D2100
      IF (ALAMB.GT.0.) ALAMB=0.                                             D2110
      IF (ACHK(KM).GT.0.) OMEGA(KM)=SUPP                                    D2120
      ACHK(KM)=SAVE                                                         D2140
      BBAR(KM)=DXSQR*ALAMB                                                  D2150
      DBAR(KM)=DXSQR*ALAMB*(-2.*PHI(JM1,KM)+PHI(JM2,KM))                    D2160
  280 DX23=2.*DX
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      DX12=2.*DX                                                        D2170
      DX2=DX                                                            D2180
      GO TO 340                                                         D2190
C                                                                       D2200
C     PART 5   B AND D ARRAYS IN X-STRETCHED REGION                     D2210
C                                                                       D2220
  290 DX2=XW(J)-XW(JM1)                                                 D2230
      IF (J.EQ.J5) GO TO 300                                            D2240
      DX3=XW(JP1)-XW(J)                                                 D2250
      DX23=DX2+DX3                                                      D2260
      DDD23R=1./(DX2*DX3*DX23)                                          D2270
      D23=DDD23R*GAMP1                                                  D2280
  300 IF (J.EQ.2) GO TO 310                                             D2290
      DX1=XW(JM1)-XW(JM2)                                               D2300
      DX12=DX1+DX2                                                      D2310
      DDD12R=1./(DX1*DX2*DX12)                                          D2320
      D12=DDD12R*GAMP1                                                  D2330
  310 DO 330 K=1,KF                                                     D2340
      ALAMB=BETASQ-D23*(DX2**2*PHI(JP1,K)+(DX3-DX2)*DX23*PHI(J,K)-DX3**2 D2350
     1*PHIOLD(K))                                                       D2360
      ACHECK=ACHK(K)                                                    D2361
      ACHK(K)=ALAMB                                                     D2370
      BCHK(K)=ALAMB-ZMACH                                               D2380
      IF (ALAMB.LT.0..AND.J.NE.2) GO TO 320                             D2390
      OMEGA(K)=SUB                                                      D2400
      BBAR(K)=-2.*DX23*DDD23R*ALAMB                                     D2410
      DBAR(K)=2.*DDD23R*ALAMB*(DX2*PHI(JP1,K)+DX3*PHI(JM1,K))           D2420
      IF (ACHECK.GT.0..OR.J.EQ.2) GO TO 330                             D2421
      BBAR(K)=BBAR(K)+2.*DDD12R*DX1*ACHECK                              D2422
      DBAR(K)=DBAR(K)+2.*DDD12R*(-DX12*PHI(JM1,K)+DX2*PHI(JM2,K))*ACHECK D2423
      BCHK(K)=BCHK(K)+ACHECK-ZMACH                                      D2424
      OMEGA(K)=1.                                                       D2425
      GO TO 330                                                         D2430
  320 OMEGA(K)=1.                                                       D2440
      ALAMB=BETASQ-D12*DX1*DX12*(PHI(J,K)-PHIOLD(K))                    D2441
      IF (ALAMB.GT.0.) ALAMB=0.                                         D2442
      IF (ACHECK.GT.0.) OMEGA(K)=SUPP                                   D2443
      BCHK(K)=ALAMB-ZMACH                                               D2444
      BBAR(K)=2.*DDD12R*DX1*ALAMB                                       D2450
      DBAR(K)=2.*DDD12R*(-DX12*PHI(JM1,K)+DX2*PHI(JM2,K))*ALAMB         D2451
  330 CONTINUE                                                          D2470
C                                                                       D2480
C     PART 6   C ARRAY, FINAL PREPARATION OF B ARRAY                    D2490
```

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C                                                                               D2500
  340 DO 350 K=1,KF                                                             D2510
      BBAR(K)=-2.+CON2(K)*BBAR(K)                                               D2520
  350 CBAR(K)=1.+CON1(K)                                                        D2530
C                                                                               D2540
C     PART 7   FINAL PREPARATION OF PRIMARY D ARRAY IN INNER REGION             D2550
C                                                                               D2560
      KGUN=IGUN(J)                                                              D2570
      DO 370 K=1,KGUN                                                           D2580
      IF (K.LE.IFUN(J)) GO TO 360                                               D2590
      DBAR(K)=-BCHK(K)*(CON3(K)*RW(K)*FUN1(J)+CON2(K)*FUN7(J))-CON2(K)*D        D2600
     1BAR(K)+CON7(K)*FUN8(J)+4.*CON3(K)*FUNY(J)                                 D2610
      GO TO 370                                                                 D2620
  360 DBAR(K)=-CON2(K)*(BCHK(K)*FUN5(J)+DBAR(K))+CON8(K)*FUN9(J)+CON9(K)        D2630
     1*FUN10(J)                                                                 D2640
  370 CONTINUE                                                                  D2650
      IF (IW.NE.0.OR.ALPHAD.EQ.0.) GO TO 390                                    D2660
      IF (J.LT.JW10) GO TO 390                                                  D2670
      IF (IWALL.EQ.0.OR.KUPA(J).LT.KM) GO TO 390                                D2680
      DO 380 K=IFNJP1,KGUN                                                      D2690
  380 DBAR(K)=DBAR(K)-CON10(K)*FUN11(J)                                         D2700
  390 DBAR(1)=DBAR(1)+CON4*SPRIME(J)                                            D2710
      KGUNP1=KGUN+1                                                             D2720
      DBAR(KGUN)=DBAR(KGUN)+CBAR(KGUN)*(RWR(KGUNP1)*FUN3(J)+FUNX(J))            D2730
C                                                                               D2740
C     PART 8   C ARRAY BENEATH WING, FINAL PREPARATION OF B AND D ARRAYS        D2750
C              BENEATH WING                                                     D2760
C                                                                               D2770
      IF (IW.EQ.0) GO TO 420                                                    D2780
      IF (J.LT.JW10.OR.J.GT.JW3) GO TO 420                                      D2790
      DO 400 K=IFUMJ,IFUNJ                                                      D2800
      BBARU(K)=-2.+CON2(K)*BBARU(K)                                             D2810
      CBARU(K)=CBAR(K)                                                          D2820
  400 DBARU(K)=CON2(K)*(BCHKU(K)*FUN5(J)-DBARU(K))+CON8(K)*FUN9(J)+CON9(        D2830
     1K)*FUN10(J)                                                               D2840
      IF (IFUMJ.GT.1) GO TO 410                                                 D2850
      DBARU(1)=DBARU(1)+CON4*SPRIME(J)                                          D2860
      GO TO 420                                                                 D2870
  410 DBARU(IFUMJ)=DBARU(IFUMJ)-ABAR(IFUMJ)*PHIU(JG,IFUMJ-1)                    D2880
C                                                                               D2890
C     PART 9   FINAL PREPARATION OF D ARRAY IN OUTER REGION FOR SUBSONIC        D2900
C              FREE STREAM MACH NUMBERS                                         D2910
C                                                                               D2920
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  420 IF (AMINF.GT.1.) GO TO 480                                          D2930
      AX=ABS(XW(J))                                                       D2940
      IF (J.GE.JXN.AND.J.LE.J3) GO TO 440                                 D2950
      DO 430 K=KGUNP1,KF                                                  D2960
      XOCR=AX/SQRT(AX**2+BETASQ*RW(K)**2)                                 D2970
  430 DBAR(K)=CON3(K)*(RWR(K)*(XOCR*FUN3(J)+.5*(1.-XOCR)*FUN3(JW3))+4.*X  D2980
     1OCR**2*FUNY(J))-CON2(K)*DBAR(K)+CON7(K)*FUN8(J)                     D2990
      GO TO 470                                                           D3000
  440 DO 450 K=KGUNP1,KF                                                  D3010
      XOCR=AXOCR(K)                                                       D3020
  450 DBAR(K)=CON3(K)*(RWR(K)*(XOCR*FUN3(J)+.5*(1.-XOCR)*FUN3(JW3))+4.*X  D3030
     1OCR**2*FUNY(J))-CON2(K)*DBAR(K)+CON7(K)*FUN8(J)                     D3040
      IF (ALPHAD.EQ.0.) GO TO 470                                         D3050
      IF (J.LT.JW10) GO TO 470                                            D3060
      IF (IWALL.EQ.0) GO TO 470                                           D3070
      DO 460 K=KGUNP1,KF                                                  D3080
  460 DBAR(K)=DBAR(K)-CON10(K)*FUN11(J)-CON11(K)*FUN12(J)                 D3090
  470 DBAR(KGUNP1)=DBAR(KGUNP1)-ABAR(KGUNP1)*(RWR(KGUN)*FUN3(J)+FUNX(J))  D3100
      GO TO 620                                                           D3110
C                                                                         D3120
C     PART 10   FINAL PREPARATION OF D ARRAY IN OUTER REGION FOR          D3130
C               SUPERSONIC FREE STREAM MACH NUMBERS                       D3140
C                                                                         D3150
  480 IF (J.GT.JW1X) GO TO 490                                            D3160
      KLO=KGUNP1                                                          D3170
      GO TO 590                                                           D3180
  490 IF (J.GT.JW3X) GO TO 500                                            D3190
      KUP=KUPA(J)                                                         D3200
      KLO=KGUNP1                                                          D3210
      GO TO 520                                                           D3220
  500 KUP=KLOA(J)                                                         D3230
      XWJ=XW(J)                                                           D3240
      DO 510 K=KGUNP1,KUP                                                 D3250
      BRSQ=(BETA*RW(K))**2                                                D3260
      ANUM1=SQRT(XWJ**2-BRSQ)                                             D3270
      ANUM2=SQRT(ABS((XWJ-XWM)**2-BRSQ))                                  D3280
  510 DBAR(K)=-CON2(K)*DBAR(K)+CON3(K)*RWR(K)*FUN3(M)*XWMSQR*(XWJ*ANUM1-  D3290
     1(XWJ+XWM)*ANUM2+BRSQ*(ALOG(XWJ-XWM+ANUM2)-ALOG(XWJ+ANUM1)))         D3300
      IF (KUP.EQ.KF) GO TO 610                                            D3310
      KLO=KUP+1                                                           D3320
      KUP=KUPA(J)                                                         D3330
  520 Z=XW(J)-BETA*RW(KLO)                                                D3340
      JJ=-1                                                               D3350
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  530 JJ=JJ+1                                                                    D3360
      JX=J-JJ                                                                    D3370
      IF (Z.LT.XW(JX)) GO TO 530                                                 D3380
      XWJ=XW(J)                                                                  D3390
      DO 550 K=KLO,KUP                                                           D3400
      BR=BETA*RW(K)                                                              D3410
      Z=XWJ-BR                                                                   D3420
      ZR=1./Z                                                                    D3430
      JJ=-1                                                                      D3440
  540 JJ=JJ+1                                                                    D3450
      JX=JX-JJ                                                                   D3460
      IF (Z.LT.XW(JX)) GO TO 540                                                 D3470
  550 DBAR(K)=CON3(K)*(RWR(K)*FUN3(JX)*(XWJ*ZR**1.5*SQRT(XWJ+BR)+(BR*ZR)         D3480
     1**2*(ALOG(BR)-ALOG(XWJ+SQRT(XWJ**2-BR**2))))+4.*FUNY(J))-CON2(K)*D         D3490
     2BAR(K)+CON7(K)*FUN8(J)                                                     D3500
      IF (ALPHAD.EQ.0.) GO TO 570                                                D3510
      IF (J.LT.JW10) GO TO 570                                                   D3520
      IF (KUP.LT.KM) GO TO 580                                                   D3530
      IF (IWALL.EQ.0) GO TO 570                                                  D3540
      DO 560 K=KLO,KUP                                                           D3550
  560 DBAR(K)=DBAR(K)-CON10(K)*FUN11(J)-CON11(K)*FUN12(J)                        D3560
  570 IF (KUP.EQ.KF) GO TO 610                                                   D3570
  580 KLO=KUP+1                                                                  D3580
  590 DO 600 K=KLO,KF                                                            D3590
  600 DBAR(K)=-CON2(K)*DBAR(K)                                                   D3600
  610 DBAR(KGUNP1)=DBAR(KGUNP1)-ABAR(KGUNP1)*(RWR(KGUN)*FUN3(J)+FUNX(J))         D3610
                                                                                 D3620
C                                                                                D3630
C     PART 11   FINAL PREPARATION OF B AND D ARRAYS AT WALL                      D3640
C                                                                                D3650
  620 IF (IWALL.EQ.0) GO TO 640                                                  D3660
      IF (IWALL.EQ.2) GO TO 630                                                  D3670
      BBAR(KM)=BBAR(KM)+CBAR(KM)-H/DX2                                           D3680
      DBAR(KM)=DBAR(KM)-H/DX2*PHI(JM1,KM)                                        D3690
      IF (OMEGA(KM).GT.1.) OMEGA(KM)=1.                                          D3700
      GO TO 640                                                                  D3710
  630 BBAR(KM)=BBAR(KM)+CBAR(KM)-H                                               D3720
C                                                                                D3730
C     PART 12   FIRST SWEEP OF THOMAS ALGORITHM(ABOVE AND BENEATH WING)          D3740
C                                                                                D3750
  640 IF (IW.EQ.0) GO TO 670                                                     D3760
      IF (IFUNJ.EQ.1) GO TO 660                                                  D3770
      IF (J.LT.JW10.OR.J.GT.JW3) GO TO 670                                       D3780
      DO 650 K=2,IFUNJ
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      KM1=K-1                                                           D3790
      BBAR(K)=ABAR(K)*CBAR(KM1)-BBAR(K)*BBAR(KM1)                       D3800
      CBAR(K)=-CBAR(K)*BBAR(KM1)                                        D3810
      DBAR(K)=ABAR(K)*DBAR(KM1)-DBAR(K)*BBAR(KM1)                       D3820
      IF (K.LE.IFUMJ) GO TO 650                                         D3830
      BBARU(K)=ABAR(K)*CBARU(KM1)-BBARU(K)*BBARU(KM1)                   D3840
      CBARU(K)=-CBARU(K)*BBARU(KM1)                                     D3850
      DBARU(K)=ABAR(K)*DBARU(KM1)-DBARU(K)*BBARU(KM1)                   D3860
  650 CONTINUE                                                          D3870
  660 K=IFNJP1                                                          D3880
      KM1=K-1                                                           D3890
      BBAR(K)=.5*ABAR(K)*(BBARU(KM1)*CBAR(KM1)+BBAR(KM1)*CBARU(KM1))-BBA D3900
     1R(K)*BBARU(KM1)*BBAR(KM1)                                         D3910
      CBAR(K)=-CBAR(K)*BBARU(KM1)*BBAR(KM1)                             D3920
      DBAR(K)=.5*ABAR(K)*(BBARU(KM1)*DBAR(KM1)+BBAR(KM1)*DBARU(KM1))-DBA D3930
     1R(K)*BBARU(KM1)*BBAR(KM1)                                         D3940
C                                                                       D3950
C     PART 13   FIRST SWEEP OF THOMAS ALGORITHM(GENERAL CASE)           D3960
C                                                                       D3970
      K8=K+1                                                            D3980
      KT=KF-IFNJP1                                                      D3990
      GO TO 680                                                         D4000
  670 K8=2                                                              D4010
      KT=KFM1                                                           D4020
  680 DO 690 K=K8,KF                                                    D4030
      KM1=K-1                                                           D4040
      BBAR(K)=ABAR(K)*CBAR(KM1)-BBAR(K)*BBAR(KM1)                       D4050
      CBAR(K)=-CBAR(K)*BBAR(KM1)                                        D4060
  690 DBAR(K)=ABAR(K)*DBAR(KM1)-DBAR(K)*BBAR(KM1)                       D4070
C                                                                       D4080
C     PART 14   SECOND SWEEP OF THOMAS ALGORITHM                        D4090
C                                                                       D4100
      PHIO(KF)=DBAR(KF)/BBAR(KF)                                        D4110
      DO 700 KK=1,KT                                                    D4120
      K=KF-KK                                                           D4130
      KP1=K+1                                                           D4140
  700 PHIO(K)=(DBAR(K)-CBAR(K)*PHIO(KP1))/BBAR(K)                       D4150
      IF (IW.EQ.0) GO TO 720                                            D4160
      IF (J.LT.JW10.OR.J.GT.JW3) GO TO 720                              D4170
      PHIOU(IFUNJ+1)=PHIO(IFUNJ+1)                                      D4180
      DO 710 KK=1,IFUNJ                                                 D4190
      K=IFNJP1-KK                                                       D4200
      KP1=K+1                                                           D4210
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      PHIO(K)=(DBAR(K)-CBAR(K)*PHIO(KP1))/BBAR(K)                       D4220
  710 PHIOU(K)=(DBARU(K)-CBARU(K)*PHIOU(KP1))/BBARU(K)                  D4230
C                                                                       D4240
C     PART 15   NEW VALUES OF VELOCITY POTENTIAL, MAXIMUM DPHI          D4250
C                                                                       D4260
  720 DO 730 K=1,KF                                                     D4270
      PHIOLD(K)=PHI(J,K)                                                D4280
      DPHI=OMEGA(K)*(PHIO(K)-PHI(J,K))                                  D4290
      IF (ABS(DPHI).LE.ABS(DPHIMX)) GO TO 730                           D4300
      DPHIMX=DPHI                                                       D4310
      JMARK=J                                                           D4320
      KMARK=K                                                           D4330
  730 PHI(J,K)=PHI(J,K)+DPHI                                            D4340
      IF (IW.EQ.0) GO TO 780                                            D4350
      IF (J.LT.JW10.OR.J.GT.JW3P1) GO TO 780                            D4360
      IF (J.LE.JW2.OR.IFUM(JG).EQ.1) GO TO 750                          D4370
      IFUMM1=IFUM(JG)-1                                                 D4380
      IFMJM1=IFUM(JG-1)                                                 D4390
      DO 740 K=IFMJM1,IFUMM1                                            D4400
  740 PHIU(JG,K)=PHI(J,K)+PHIU(JG-1,K)-PHI(J-1,K)+DLTPH                 D4410
      IF (IFUMM1.EQ.IFUNJ) GO TO 780                                    D4420
  750 IFNJP1=IFUN(J+1)                                                  D4430
      DO 760 K=1,IFNJP1                                                 D4440
  760 PHIUO(K)=PHIU(JG,K)                                               D4450
      DO 770 K=IFUMJ,IFUNJ                                              D4460
      DPHI=OMEGAU(K)*(PHIOU(K)-PHIU(JG,K))                              D4470
      IF (ABS(DPHI).LE.DPHIMX) GO TO 770                                D4480
      DPHIMX=DPHI                                                       D4490
      JMARK=-J                                                          D4500
      KMARK=-K                                                          D4510
  770 PHIU(JG,K)=PHIU(JG,K)+DPHI                                        D4520
  780 CONTINUE                                                          D4530
      IF (AMINF.LE.1.) GO TO 800                                        D4540
      DO 790 K=1,KF                                                     D4550
C                                                                       D4570
C     PART 16   PRINT MAXIMUM DPHI, CHECK CONVERGENCE                   D4580
C                                                                       D4590
  790 PHI(J5,K)=2.*PHI(J5-1,K)-PHI(J5-2,K)                              D4560
  800 PRINT 850, I,JMARK,KMARK,DPHIMX                                   D4600
      IF (I.GT.1) SUPP=SUP                                              D4610
      IF (I.EQ.IMAX) RETURN                                             D4620
      IF (ABS(DPHIMX).GE.EPSI) GO TO 10                                 D4630
      RETURN                                                            D4640
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C                                                                       D4650
  810 FORMAT (16H SUBROUTINE WORK///)                                   D4660
  820 FORMAT (52H    LOCATION AND VALUE OF GREATEST CHANGE IN VELOCITY) D4670
  830 FORMAT (48H    POTENTIAL ( NEGATIVE LOCATION INDICES ARE FOR)     D4680
  840 FORMAT (22H    POINTS UNDER WING )//)                             D4690
  850 FORMAT (3H I=I5,2X,6HJMARK=I5,2X,6HKMARK=I5,2X,7HDPHIMX=E16.8)    D4700
      END                                                               D4710-
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      OVERLAY (DICK,1,3)                                                E    0
      PROGRAM RESULT                                                    E   10
      COMMON SIGMA,DELTA,I,BETASQ,DXR,DXSQR,GAMP1,GP1DXR,KMM1,KFM1,KF,DE  E   20
     1LETA,PIR,CON4,CON5,H,JT,JI,JF,DPHIMX,DX,JXN,SNO,CS2O,SNALP,JW,JW1  E   30
     2O,JW2O,JW1X,JW3X,BETA,JW3M1,DLTPH,JCHCK,IW,JW1CM2,JW3P1,JW1OM1,M,X  E   40
     3WM,XWMSQR,PI,AK2,AX2,AK1,AX1,AX1O,CNX,NAMXP1,A1,A2,ZMACH,JMCK     E   50
      COMMON R(120),SPRIME(120),FUN(120),XW(120),Y1(120),Y2(120),FUN1(12  E   60
     1O),FUNO(120),IFUN(120),FUN2(120),FUN3(120),FUN4(120),IGUN(120),CP(  E   70
     2120),FUNX(120),SLAS(120,6),CPO(120),KLOA(120),KUPA(120),FUN5(120),  F   80
     3FUN6(120),FUN7(120),FUNY(120),CP1(120),CP2(120)                   E   90
      COMMON FUN8(120),FUN9(120),FUN10(120),FUN11(120),Y2PRM(120),FUN12(  E  100
     1120),FUNA(120),FUNB(120)                                          E  110
      COMMON CON7(100),CON8(100),CON9(100),CON10(100),CON11(100),CON1(10  F  120
     1O),CON2(100),CON3(100),OMEGA(100),ABAR(100),BBAR(100),CBAR(100),DB  E  130
     2AR(100),PHIO(100),RW(100),RWR(100),AXOCR(100),ACHK(100),PHIOLD(100  F  140
     3),BCHK(100)                                                       E  150
      COMMON PHIUO(25),OMEGAU(25),ACHKU(25),BBARU(25),CBARU(25),DBARU(25  E  160
     1),BCHKU(25),PHIOU(25)                                             E  170
      COMMON IFUM(50),VLAM(50),VTAU(50),VLAMP(50),VTAUP(50),YV(50),ZV(50  E  180
     1),FUNAO(50),FUNBO(50),UUOD(50),UU9OD(50)                          E  190
      COMMON PHI(109,50),PHIU(50,25),COEF(21)                           E  200
      COMMON /NMLIST/ J1,J2,J3,J4,J5,FAC,KM,RCOM,A,B,IWALL,P,OMEGAD,ALPH  E  210
     1AD,HSPAN,AMINF,GAMMA,IR,RC,RMAX,RN,JS,RS,JW1,JW2,JW3,JWD,IWING,B1,  E  220
     2B2,DEL1,DEL,IVOR,IDIR,EPSI,SUB,SUP,IMAX,SFACTOR                   E  230
      DIMENSION NAM(2)                                                  E  240
      DATA NAM/7HBBAR(K),6HFUN(J)/                                      F  250
C                                                                       E  260
C     PART 1   SHOCK-WAVE AND SONIC LINE LOCATIONS                      E  270
C                                                                       E  280
      PRINT 1070                                                        E  290
      IF (AMINF.GT.1.) J1=J1+2                                          E  300
      IF (AMINF.GT.1.) J4=J4-2                                          E  310
      DO 250 J=J1,J4                                                    E  320
      KK=1                                                              F  330
      KK2=1                                                             E  340
      JP1=J+1                                                           E  350
      JM1=J-1                                                           E  360
      JM2=J-2                                                           E  370
      DO 170 K=1,KF                                                     E  380
      IF (RW(K).LT.R(J)) GO TO 160                                      E  390
      IF (K.LE.IGUN(JM1).AND.K.GT.IFUN(J)) GO TO 10                     E  400
      PHIM1=PHI(JM1,K)                                                  E  410
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      IF (K.LE.IGUN(JP1).AND.K.GT.IFUN(J)) GO TO 20                    E 420
      PHIP1=PHI(JP1,K)                                                 E 430
      GO TO 30                                                         E 440
   10 PHIM1=PHI(JM1,K)+RWR(K)*FUN3(JM1)+FUNX(JM1)                      E 450
   20 PHIP1=PHI(JP1,K)+RWR(K)*FUN3(JP1)+FUNX(JP1)                      E 460
   30 U=.5*DXR*(PHIP1-PHIM1)                                           E 470
      IF (K.LE.IFUN(J)) U=U+FUN4(J)                                    E 480
      ALAMB=BETASQ-GAMP1*U                                             E 490
      IF (K.LE.IGUN(JM2).AND.K.GT.IFUN(J)) GO TO 40                    E 500
      PHIM2=PHI(JM2,K)                                                 E 510
      IF (K.LE.IGUN(J).AND.K.GT.IFUN(J)) GO TO 50                      E 520
      PHIMO=PHI(J,K)                                                   E 530
      IF (K.LE.IGUN(J+2).AND.K.GT.IFUN(J)) GO TO 60                    E 540
      FIP2=PHI(J+2,K)                                                  E 550
      GO TO 70                                                         E 560
   40 PHIM2=PHI(JM2,K)+RWR(K)*FUN3(JM2)+FUNX(JM2)                      E 570
   50 PHIMO=PHI(J,K)+RWR(K)*FUN3(J)+FUNX(J)                            E 580
   60 FIP2=PHI(J+2,K)+RWR(K)*FUN3(J+2)+FUNX(J+2)                       E 590
   70 FIP1=PHIP1                                                       E 600
      FIMO=PHIMO                                                       E 610
      FIM1=PHIM1                                                       E 620
      FIM2=PHIM2                                                       E 630
      IF (ALAMB.GT.0.) GO TO 80                                        E 640
      U=.5*DXR*(3.*PHIMO-4.*PHIM1+PHIM2)                               E 650
      IF (K.LE.IFUN(J)) U=U+FUN4(J)                                    E 660
      ALAMB=BETASQ-GAMP1*U                                             E 670
      IF (ALAMB.LT.0.) GO TO 80                                        E 680
      U=BETASQ/GAMP1                                                   E 690
   80 IF (K.EQ.1) GO TO 130                                            E 700
      IF (K.EQ.KF) GO TO 140                                           E 710
      KM1=K-1                                                          E 720
      KP1=K+1                                                          E 730
      DR1=RW(K)-RW(KM1)                                                E 740
      DR2=RW(KP1)-RW(K)                                                E 750
      DD1=DR1/(DR2*(DR1+DR2))                                          E 760
      DD2=(DR2-DR1)/(DR1*DR2)                                          E 770
      DD3=-DR2/(DR1*(DR1+DR2))                                         E 780
      IF (KP1.LE.IGUN(J).AND.K.GT.IFUN(J)) GO TO 90                    E 790
      PHIP1=PHI(J,KP1)                                                 E 800
      IF (K.LE.IGUN(J).AND.K.GT.IFUN(J)) GO TO 100                     E 810
      PHIMO=PHI(J,K)                                                   E 820
      IF (KM1.LE.IGUN(J).AND.K.GT.IFUN(J)) GO TO 110                   E 830
      PHIM1=PHI(J,KM1)                                                 E 840
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      GO TO 120                                                                 E 850
   90 PHIP1=PHI(J,KP1)+RWR(KP1)*FUN3(J)+FUNX(J)                                 E 860
  100 PHIM0=PHI(J,K)+RWR(K)*FUN3(J)+FUNX(J)                                     E 870
  110 PHIM1=PHI(J,KM1)+RWR(KM1)*FUN3(J)+FUNX(J)                                 E 880
  120 V=DD1*PHIP1+DD2*PHIM0+DD3*PHIM1                                           E 890
      GO TO 150                                                                 E 900
  130 V=.5*DXR*(R(JP1)-R(JM1))-SNALP*SNO                                        E 910
      GO TO 150                                                                 E 920
  140 KM1=K-1                                                                   E 930
      V=(PHI(J,K)-PHI(J,KM1))/(RW(K)-RW(KM1))                                   E 940
  150 CSO=SQRT(ABS(1.-SNO**2))                                                  E 950
      SN2O=2.*SNO*CSO                                                           E 960
      W=(SNALP*CSO/RW(K)*FUN3(J)-.5*FUN(J)*SN2O)/RW(K)                          E 970
      IF (K.LE.IFUN(J)) V=V-SNALP*SNO                                           E 980
      IF (K.LE.IFUN(J)) W=0.                                                    E 990
      USQ=(1.+U)**2+V**2+W**2                                                   E1000
      OMEGA(K)=AMINF*SQRT(ABS(USQ/(1.+.5*(GAMMA-1.)*AMINF**2*(1.-USQ))))       E1010
      PHIOLD(K)=(FIP1-FIM2-3.*(FIM0-FIM1))*DXR**3                               E1020
      PHIO(K)=(FIP2-FIM1-3.*(FIP1-FIM0))*DXR**3                                 E1030
      BBAR(K)=DXR**2*(FIP1+FIM1-2.*FIM0)                                        E1040
      GO TO 170                                                                 E1050
  160 KK=KK+1                                                                   E1060
  170 CONTINUE                                                                  E1070
      KKP1=KK+1                                                                 E1080
      KTT=KF+KKP1                                                               E1090
      IIC=0                                                                     E1100
      KKP10=KKP1                                                                E1110
      DO 180 II=1,6                                                             E1120
  180 SLAS(J,II)=0.                                                             E1130
      DO 240 II=1,6                                                             E1140
      DO 220 K1=KKP1,KF                                                         E1150
      K2=KTT-K1                                                                 E1160
      K2M1=K2-1                                                                 E1170
      IF (OMEGA(K2).GT.1..AND.OMEGA(K2M1).GT.1.) GO TO 190                      E1180
      IF (OMEGA(K2).LT.1..AND.OMEGA(K2M1).LT.1.) GO TO 220                      E1190
      SLAS(J,II)=RW(K2)-(RW(K2)-RW(K2M1))*(OMEGA(K2)-1.)/(OMEGA(K2)-OMEG        E1200
     1A(K2M1))                                                                  E1210
      GO TO 230                                                                 E1220
  190 IF (PHIOLD(K2).GT.0..OR.PHIO(K2).LT.0.) GO TO 220                         E1230
      IF (BBAR(K2).GT.0.) GO TO 220                                             E1240
      IF (K2.EQ.KF.OR.K2.EQ.KKP10) GO TO 220                                    E1250
      IF (PHIOLD(K2M1).GT.0..AND.PHIOLD(K2+1).GT.0.) GO TO 220                  E1260
      IF (PHIOLD(K2M1).GT.0.) GO TO 200                                         E1270
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      IF (PHIOLD(K2+1).GT.0.) GO TO 210                                  E1280
      GO TO 220                                                          E1290
  200 SLAS(J,II)=RW(K2)+(RW(K2-1)-RW(K2))*PHIOLD(K2)/(PHIOLD(K2)-PHIOLD( E1300
     1K2-1))                                                             E1310
      GO TO 230                                                          E1320
  210 SLAS(J,II)=RW(K2)+(RW(K2+1)-RW(K2))*PHIOLD(K2)/(PHIOLD(K2)-PHIOLD( E1330
     1K2+1))                                                             E1340
      GO TO 230                                                          E1350
  220 CONTINUE                                                           E1360
      GO TO 250                                                          E1370
  230 KKP1=K1+1                                                          E1380
      IF (KKP1.GT.KF) GO TO 250                                          E1390
  240 CONTINUE                                                           E1400
  250 PRINT 1080, J,XW(J),(SLAS(J,II),II=1,6)                            E1410
C                                                                        E1420
C     PART 2   PRESSURE COEFFICIENTS AT GRID POINTS                      E1430
C                                                                        E1440
      PRINT 1090                                                         E1450
      IF (IW.EQ.0) GO TO 290                                             E1460
      IFNJW3=IFUN(JW3)                                                   E1470
      PHIU(JW3-JW10+3,IFNJW3+1)=PHI(JW3,IFNJW3+1)                        E1471
      DO 280 K=1,IFNJW3                                                  E1480
      IMK=0                                                              E1490
      DO 280 J=JW2,JW3P1                                                 E1500
      JG=J-JW10+3                                                        E1510
      IF (IMK.EQ.1) GO TO 260                                            E1520
      IF (IMK.EQ.2) GO TO 270                                            E1530
      IF (IFUM(JG+1).LE.K) GO TO 280                                     E1540
      IMK=1                                                              E1550
      CONN=PHIU(JG,K)-PHI(J,K)                                           E1560
      GO TO 280                                                          E1570
  260 IMK=2                                                              E1580
      GO TO 280                                                          E1590
  270 PHIU(JG,K)=PHI(J,K)+CONN                                           E1600
  280 CONTINUE                                                           E1610
  290 IF (IVOR.EQ.0) GO TO 300                                           E1620
      IF (JCHCK.EQ.JW3) GO TO 300                                        E1630
      JG=JCHCK-JW10+3                                                    E1640
      GAMO=.5*Y2(JCHCK)*(VLAM(JG)+VTAU(JG)**2/VLAM(JG))                  E1650
      GAMO=GAMO*FUNA(JCHCK)*(1.+(R(JCHCK)/Y2(JCHCK))**2)                 E1660
  300 DO 530 K=1,KF                                                      E1670
      ALAMB=1.                                                           E1680
      DO 520 J=J1,J4                                                     E1690
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      JP1=J+1                                                          E1700
      JM1=J-1                                                          F1710
      JM2=J-2                                                          E1720
      ACHKK=ALAMB                                                      E1730
      JG=J-JW10+3                                                      E1740
      IF (K.GT.IFUN(J)) GO TO 310                                      E1750
      PHIM1=PHI(JM1,K)                                                 E1760
      PHIM0=PHI(J,K)                                                   E1770
      PHIP1=PHI(JP1,K)                                                 E1780
      GO TO 350                                                        E1790
  310 IF (K.LE.IGUN(JM1)) GO TO 320                                    E1800
      PHIM1=PHI(JM1,K)                                                 E1810
      IF (K.LE.IGUN(J)) GO TO 330                                      E1820
      PHIM0=PHI(J,K)                                                   E1830
      IF (K.LE.IGUN(JP1)) GO TO 340                                    E1840
      PHIP1=PHI(JP1,K)                                                 E1850
      GO TO 350                                                        E1860
  320 PHIM1=PHI(JM1,K)+RWR(K)*FUN3(JM1)+FUNX(JM1)                      E1870
  330 PHIM0=PHI(J,K)+RWR(K)*FUN3(J)+FUNX(J)                            E1880
  340 PHIP1=PHI(JP1,K)+RWR(K)*FUN3(JP1)+FUNX(JP1)                      E1890
      IF (K.LE.IFUN(JP1)) PHIP1=PHI(JP1,K)                             E1900
      IF (IW.EQ.0.OR.K.GT.IFUN(JP1).OR.J.GT.JW3) GO TO 350             E1910
      PHIP1=PHIP1+.5*(PHIU(JG+1,K)-PHI(JP1,K))                         E1920
  350 U=.5*DXR*(PHIP1-PHIM1)                                           E1930
      IF (K.LE.IFUN(J)) U=U+FUN4(J)                                    E1940
      ALAMB=BETASQ-GAMP1*U                                             E1950
      IF (ALAMB.GT.0..OR.ACHKK.GT.0.) GO TO 360                        E1960
      SAVE=U                                                           E1970
      U=DXR*(PHIM0-PHIM1)                                              E1980
      IF (K.LE.IFUN(J)) U=U+FUN4(J)                                    E1990
      CHECK=BETASQ-GAMP1*U                                             E2000
      IF (CHECK.GT.0.) U=SAVE                                          E2010
      ALAMB=BETASQ-GAMP1*U                                             E2020
  360 IF (ACHKK.LT.0..AND.ALAMB.GT.0.) U=DXR*(PHIM0-PHIM1)             E2030
      IF (ACHKK.LT.0..AND.ALAMB.GT.0..AND.K.LE.IFUN(J)) U=U+FUN4(J)    E2040
      IF (IW.EQ.0.OR.K.GT.IFUN(J).OR.J.GT.JW3) GO TO 380               E2050
      UO=.5*DXR*(PHIU(JG+1,K)-PHIU(JG-1,K))-FUN4(J)                    E2060
      UU=DXR*(PHIU(JG,K)-PHIU(JG-1,K))-FUN4(J)                         E2070
      UO=UO-2.*FUNO(J)                                                 E2080
      UU=UU-2.*FUNO(J)                                                 E2090
      ALAMBO=BETASQ-GAMP1*UO                                           E2100
      IF (ALAMBO.LT.0.) GO TO 370                                      E2110
      ALAMBU=BETASQ-GAMP1*UU                                           E2120
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      IF (ALAMBU.LT.0.) UO=UU                                                  E2130
      GO TO 380                                                                E2140
  370 UO=UU                                                                    E2150
  380 IF (K.EQ.1) GO TO 440                                                    E2160
      IF (K.EQ.KF) GO TO 450                                                   E2170
      KM1=K-1                                                                  E2180
      KP1=K+1                                                                  E2190
      DR1=RW(K)-RW(KM1)                                                        E2200
      DR2=RW(KP1)-RW(K)                                                        E2210
      DD1=DR1/(DR2*(DR1+DR2))                                                  E2220
      DD2=(DR2-DR1)/(DR1*DR2)                                                  E2230
      DD3=-DR2/(DR1*(DR1+DR2))                                                 E2240
      IF (K.GT.IFUN(J)) GO TO 390                                              E2250
      V=DD1*PHI(J,KP1)+DD2*PHI(J,K)+DD3*PHI(J,KM1)                             E2260
      W=0.                                                                     E2270
      IF (IW.EQ.0.OR.J.GT.JW3) GO TO 470                                       E2280
      VO=DD1*PHIU(JG,KP1)+DD2*PHIU(JG,K)+DD3*PHIU(JG,KM1)                      E2290
      GO TO 470                                                                E2300
  390 IF (KP1.LE.IGUN(J)) GO TO 400                                            E2310
      PHIP1=PHI(J,KP1)                                                         E2320
      IF (K.LE.IGUN(J)) GO TO 410                                              E2330
      PHIMO=PHI(J,K)                                                           E2340
      IF (KM1.LE.IGUN(J)) GO TO 420                                            E2350
      PHIM1=PHI(J,KM1)                                                         E2360
      GO TO 430                                                                E2370
  400 PHIP1=PHI(J,KP1)+RWR(KP1)*FUN3(J)+FUNX(J)                                E2380
  410 PHIMO=PHI(J,K)+RWR(K)*FUN3(J)+FUNX(J)                                    E2390
  420 PHIM1=PHI(J,KM1)+RWR(KM1)*FUN3(J)+FUNX(J)                                E2400
  430 V=DD1*PHIP1+DD2*PHIMO+DD3*PHIM1                                          E2410
      GO TO 460                                                                E2420
  440 V=(PHI(J,2)-PHI(J,1))/(RW(2)-RW(1))                                      E2430
      IF (K.GT.IFUN(J)) GO TO 460                                              E2440
      W=0.                                                                     E2450
      IF (IW.EQ.0.OR.J.GT.JW3) GO TO 470                                       E2460
      VO=(PHIU(JG,2)-PHIU(JG,1))/(RW(2)-RW(1))                                 E2470
      GO TO 470                                                                E2480
  450 KM1=K-1                                                                  E2490
      V=(PHI(J,K)-PHI(J,KM1))/(RW(K)-RW(KM1))                                  E2500
  460 CSO=SQRT(ABS(1.-SNO**2))                                                 E2510
      SN2O=2.*SNO*CSO                                                          E2520
      W=(SNALP*CSO/RW(K)*FUN3(J)-.5*FUN(J)*SN2O)/RW(K)                         E2530
  470 CP(J)=-2.*U-V**2-W**2                                                    E2540
      IF (IW.EQ.0.OR.J.LT.JW10.OR.J.GT.JW3.OR.K.GT.IFUN(JW3)) GO TO 520        E2550
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      IF (K.GT.IFUN(J)) GO TO 510                                       E2560
      CPO(J)=-2.*UO-VO**2                                               E2570
      IF (Y2(J).LT.RW(K)) GO TO 510                                     E2580
      IF (RW(K).LT.RMAX) GO TO 520                                      E2590
      HB=Y2(J)+R(J)**2/Y2(J)                                            E2600
      HBP=Y2PRM(J)*(1.-(R(J)/Y2(J))**2)+PIR/Y2(J)*SPRIME(J)             E2610
      FNUM1=0.                                                          E2620
      ARG1=HB**2-(RW(K)+R(J)**2/RW(K))**2                               E2621
      IF(ARG1.GT.1.E-06) FNUM1=1./SQRT(ARG1)                            E2622
      JG=J-JW10+3                                                       E2630
      FNUM1=FNUM1*FUNAO(JG)                                             E2631
      DUX=SNALP*(HB*HBP-(1.+(R(J)/RW(K))**2)*SPRIME(J)*PIR)*FNUM1-FUN4(J E2640
     1)                                                                 E2650
      DUX=DUX+SQRT(HB**2-(RW(K)+R(J)**2/RW(K))**2)*SNALP*FUNBO(JG)      E2660
      U3=U+DUX-FUNO(J)                                                  E2670
      U4=UO-DUX+FUNO(J)                                                 E2680
      DVX=-SNALP*FNUM1*(1.-(R(J)/RW(K))**2)*(RW(K)+R(J)**2/RW(K))       E2690
      V3=V+DVX                                                          E2700
      V4=VO-DVX                                                         E2710
      IF (IVOR.EQ.0) GO TO 500                                          E2720
      IF (J.GT.JCHCK) GO TO 480                                         E2730
      DUY=SNALP*(HBP*(VLAM(JG)**2+VTAU(JG)**2)+2.*HB*(VLAM(JG)*VLAMP(JG) E2740
     1+VTAU(JG)*VTAUP(JG)))                                             E2750
      DUY=DUY*FUNA(J)+SNALP*HB*(VLAM(JG)**2+VTAU(JG)**2)*FUNB(J)        E2760
      U=U3-DUY*VTAU(JG)/(1.-VTAU(JG)**2)                                E2770
      UO=U4-DUY*VTAU(JG)/(1.-VTAU(JG)**2)                               E2780
      BNUM1=.5*(VLAM(JG)+VTAU(JG)**2/VLAM(JG))                          E2790
      GAN=BNUM1*HB                                                      E2800
      DGANDX=BNUM1*HBP+HB*(.5*(1.-(VTAU(JG)/VLAM(JG))**2)*VLAMP(JG)+VTAU E2810
     1(JG)/VLAM(JG)*VTAUP(JG))                                          E2820
      DGANDX=DGANDX*FUNA(J)+GAN*FUNB(J)                                 E2830
      GAN=GAN*FUNA(J)                                                   E2840
      GO TO 490                                                         E2850
  480 GAN=GANO                                                          E2860
      DGANDX=0.                                                         E2870
      DUY=SNALP*GAN*(((1.-VTAU(JG))/((1.-VTAU(JG))**2+VLAM(JG)**2)+1./(1 E2880
     1.+VTAU(JG)))*VLAMP(JG)+VLAM(JG)*(1./((1.-VTAU(JG))**2+VLAM(JG)**2) E2890
     2-1./(1.+VTAU(JG))**2)*VTAUP(JG))                                  E2900
      U=U3-DUY                                                          E2910
      UO=U4-DUY                                                         E2920
  490 V=V3                                                              E2930
      VO=V4                                                             E2940
      Y2N=(RW(K)+R(J)**2/RW(K))/HB                                      E2950
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      BNUM2=SQRT(1.-Y2N**2)                                              E2960
      CNUM3=BNUM2-VTAU(JG)                                               E2970
      CNUM4=BNUM2+VTAU(JG)                                               E2980
      BNUM3=Y2N**2/(BNUM2*HB)*VLAM(JG)                                   E2990
      BNUM4=VLAM(JG)/(BNUM2*HB*RW(K))*Y2N*PIR                            E3000
      DNUM3=CNUM3**2+VLAM(JG)**2                                         E3010
      DNUM4=CNUM4**2+VLAM(JG)**2                                         E3020
      ENUM3=CNUM3**2-VLAM(JG)**2                                         E3030
      ENUM4=CNUM4**2-VLAM(JG)**2                                         E3040
      ARG3=2.*VLAM(JG)*CNUM3                                             E3050
      ARG4=2.*VLAM(JG)*CNUM4                                             E3060
      THETA3=ATAN2(ARG3,ENUM3)                                           E3070
      THETA4=-ATAN2(ARG4,ENUM4)                                          E3080
      U3=U+SNALP*(THETA3*DGANDX+2.*GAN/DNUM3*(CNUM3*VLAMP(JG)-BNUM3*HBP+ E3090
     1VLAM(JG)*VTAUP(JG)+BNUM4*SPRIME(J)))                               E3100
      U4=UO-SNALP*(THETA4*DGANDX+2.*GAN/DNUM4*(CNUM4*VLAMP(JG)-BNUM3*HBP E3110
     1-VLAM(JG)*VTAUP(JG)+BNUM4*SPRIME(J)))                              E3120
      BNUM4=1.-(R(J)/RW(K))**2                                           E3130
      V3=V+2.*SNALP*Y2N*VLAM(JG)*GAN*BNUM4/(BNUM2*DNUM3)                 E3140
      V4=VO-2.*SNALP*Y2N*VLAM(JG)*GAN*BNUM4/(BNUM2*DNUM3)                E3150
  500 W3=-SNALP                                                          E3160
      W4=-SNALP                                                          E3170
      CP1(J)=-2.*(U3+SNALP*W3)-V3**2-W3**2                               E3180
      CP2(J)=-2.*(U4+SNALP*W4)-V4**2-W4**2                               E3190
      GO TO 520                                                          E3200
  510 CPO(J)=CP(J)                                                       E3210
      CP1(J)=0.                                                          E3220
      CP2(J)=0.                                                          E3230
  520 CONTINUE                                                           E3240
      PRINT 1110, K,J1,J4,(CP(J),J=J1,J4)                                E3250
      IF (IW.EQ.0.OR.K.GT.IFUN(JW3)) GO TO 530                           E3260
      PRINT 1100, K,JW10,JW3,(CPO(J),J=JW10,JW3)                         E3270
      IF (RW(K).LT.RMAX) GO TO 530                                       E3280
      PRINT 1100, K,JW10,JW3,(CP1(J),J=JW10,JW3)                         E3290
      PRINT 1100, K,JW10,JW3,(CP2(J),J=JW10,JW3)                         E3300
  530 CONTINUE                                                           E3310
C                                                                        E3320
C     PART 3   PERTURBATION VELOCITY POTENTIAL AT GRID POINTS            E3330
C                                                                        E3340
      PRINT 1120                                                         E3350
      JOL=1                                                              E3360
      JPU=JW3-JW10+4                                                     E3370
      DO 540 K=1,KF                                                      E3380
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      PRINT 1110, K,J1,J4,(PHI(J,K),J=J1,J4)                            E3390
      IF (IW.EQ.0.OR.K.GT.IFUN(JW3)) GO TO 540                          E3400
      PRINT 1100, K,JOL,JPU,(PHIU(J,K),J=1,JPU)                         E3410
  540 CONTINUE                                                          E3420
C                                                                       E3430
C     PART 4   AXIAL LIFT DISTRIBUTION - LIFT AND MOMENT                E3440
C                                                                       E3450
      IF (ALPHAD.EQ.0..OR.HSPAN.EQ.0.) GO TO 750                        E3460
      PRINT 1130                                                        E3470
      JG=JW3-JW10+3                                                     E3480
      AINT=0.                                                           E3490
      IF (IW.EQ.0) GO TO 570                                            E3500
      K=1                                                               E3510
      AINT=-2.*(PHI(JW3,1)-PHIU(JG,1))*RW(1)                            E3520
  550 K=K+1                                                             E3530
      IF (K.GT.IFUN(JW3)) GO TO 560                                     E3540
      AINT=-(PHI(JW3,K)+PHI(JW3,K-1)-PHIU(JG,K)-PHIU(JG,K-1))*(RW(K)-RW(E3550
     1K-1))+AINT                                                        E3560
      GO TO 550                                                         E3570
  560 AINT=AINT-(PHI(JW3,K-1)-PHIU(JG,K-1))*(Y2(JW3)-RW(K-1))           E3580
  570 AINT=-AINT                                                        E3590
      ALA=SNALP/PIR*((Y2(JW3)-R(JW3)**2/Y2(JW3))**2*FUNAO(JW3-JW10+3)+R(E3600
     1  JW3)**2)+AINT                                                  E3601
      IF (IVOR.EQ.0) GO TO 590                                          E3610
      IF (JCHCK.LT.JW3) GO TO 580                                       E3620
      ALS=ALA+SNALP/PIR*2.*(VLAM(JG)**2+VTAU(JG)**2)*(Y2(JW3)+R(JW3)**2/E3630
     1Y2(JW3))**2*FUNA(J)                                               E3640
      GO TO 600                                                         E3650
  580 ALS=ALA+SNALP/PIR*4.*GANO*VLAM(JG)*(Y2(JW3)+R(JW3)**2/Y2(JW3))    E3660
      GO TO 600                                                         E3670
  590 ALS=ALA                                                           E3680
  600 ALANS=ALA-AINT                                                    E3690
      ALSNS=ALS-AINT                                                    E3700
      AINTO=AINT                                                        E3710
      SMA=ALS-ALA                                                       E3720
      CP(J2)=0.                                                         E3730
      CPO(J2)=0.                                                        E3740
      CP1(J2)=0.                                                        E3750
      CP2(J2)=0.                                                        E3760
      JW10M1=JW10-1                                                     E3770
      J2P1=J2+1                                                         E3780
      IF (JW10M1.LE.J2) GO TO 620                                       E3790
      DO 610 J=J2P1,JW10M1                                              E3800
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      CP(J)=SNALP*SPRIME(J)                                                    E3810
      CP1(J)=CP(J)                                                             E3820
      CP2(J)=CP(J)                                                             E3830
  610 CPO(J)=CP(J)                                                             E3840
  620 DO 700 J=JW10,JW3                                                        E3850
      AINT=0.                                                                  E3860
      JG=J-JW10+3                                                              E3870
      IF (IW.EQ.0) GO TO 650                                                   E3880
      IF (IFUN(J).EQ.0) GO TO 660                                              E3890
      K=1                                                                      E3900
      AINT=-(PHI(J+1,1)-PHI(J-1,1)-PHIU(JG+1,1)+PHIU(JG-1,1))*DXR*RW(1)        E3910
  630 K=K+1                                                                    E3920
      IF (K.GT.IFUN(J)) GO TO 640                                              E3930
      AINT=AINT-.5*DXR*(PHI(J+1,K)-PHI(J-1,K)+PHI(J+1,K-1)-PHI(J-1,K-1)-       E3940
     1PHIU(JG+1,K)+PHIU(JG-1,K)-PHIU(JG+1,K-1)+PHIU(JG-1,K-1))*(RW(K)-RW       E3950
     2(K-1))                                                                   E3960
      GO TO 630                                                                E3970
  640 AINT=AINT-.5*DXR*(PHI(J+1,K-1)-PHI(J-1,K-1)-PHIU(JG+1,K-1)+PHIU(JG       E3980
     1-1,K-1))*(Y2(J)-RW(K-1))                                                 E3990
  650 AINT=-AINT                                                               E4000
  660 Y2P=Y2PRM(J)                                                             E4010
      JG=J-JW10+3                                                              E4011
      CP(J)=SNALP*(2.*((1.-(R(J)/Y2(J))**4)*Y2(J)*Y2P/PIR-2.*(1.-(R(J)/Y       E4020
     12(J))**2)*SPRIME(J))*FUNAO(JG)+(Y2(J)-R(J)**2/Y2(J))**2/PIR*FUNBO(       E4030
     2JG)+SPRIME(J))                                                           E4040
      IF (J.GE.JW20) CP(J)=.85*CP(J)*SQRT(ABS((Y2(J)-Y1(J))/(Y2(J)+Y1(J)       E4060
     1)))                                                                      E4070
      CP(J)=CP(J)+AINT                                                         E4080
      HB=Y2(J)+R(J)**2/Y2(J)                                                   E4090
      HBP=Y2P*(1.-(R(J)/Y2(J))**2)+PIR/Y2(J)*SPRIME(J)                         E4100
      IF (IVOR.EQ.0) GO TO 680                                                 E4110
      IF (J.GT.JCHCK) GO TO 670                                                E4120
      CPO(J)=CP(J)+4./PIR*SNALP*HB*(HB*(VLAM(JG)*VLAMP(JG)+VTAU(JG)*VTAU       E4130
     1P(JG))+HBP*(VLAM(JG)**2+VTAU(JG)**2))*FUNA(J)+2./PIR*SNALP*HB**2*(       E4140
     2VLAM(JG)**2+VTAU(JG)**2)*FUNB(J)                                         E4150
      GO TO 690                                                                E4160
  670 CPO(J)=CP(J)+4./PIR*SNALP*GANO*(HB*VLAMP(JG)+VLAM(JG)*HBP)               E4170
      GO TO 690                                                                E4180
  680 CPO(J)=CP(J)                                                             E4190
  690 CP1(J)=CP(J)-AINT                                                        E4200
      CP2(J)=CPO(J)-AINT                                                       E4210
      DCP=CPO(J)-CP(J)                                                         E4220
  700 PRINT 1060, J,CP(J),CPO(J),CP1(J),CP2(J),AINT,DCP                        E4230
```

```
      AMA=0.                                                            E4240
      AMS=0.                                                            E4250
      AMANS=0.                                                          E4260
      AMSNS=0.                                                          E4270
      DO 710 J=J2P1,JW3                                                 E4280
      AMA=AMA+.5*(CP(J)+CP(J-1))*(XW(J)-.5*DX)*DX                       E4290
      AMANS=AMANS+.5*(CP1(J)+CP1(J-1))*(XW(J)-.5*DX)*DX                 E4300
      AMSNS=AMSNS+.5*(CP2(J)+CP2(J-1))*(XW(J)-.5*DX)*DX                 E4310
  710 AMS=AMS+.5*(CP0(J)+CP0(J-1))*(XW(J)-.5*DX)*DX                     E4320
      IF (JW2.EQ.JW3) GO TO 730                                         E4330
      DLO=SNALP/PIR*((Y2(JW20)-R(JW20)**2/Y2(JW20))**2+R(JW20)**2-(Y2(JW E4340
     13)-R(JW3)**2/Y2(JW3))**2-R(JW3)**2)                               E4350
      DO 720 J=JW20,JW3M1                                               E4360
  720 DLO=DLO+.5*DX*(CP1(J)+CP1(J+1))                                   E4370
      ALA=ALA+DLO                                                       E4380
      ALS=ALS+DLO                                                       E4390
      ALANS=ALANS+DLO                                                   E4400
      ALSNS=ALSNS+DLO                                                   E4410
  730 XBARA=AMA/ALA                                                     E4420
      XBARS=AMS/ALS                                                     E4430
      XBARAN=AMANS/ALANS                                                E4440
      XBARSN=AMSNS/ALSNS                                                E4450
      AREA=0.                                                           E4460
      JW1P1=JW1+1                                                       E4470
      DO 740 J=JW1P1,JW3                                                E4480
      AREA=AREA+.5*DX*(Y2(J)+Y2(J-1)-R(J)-R(J-1))                       E4490
      IF (J.LE.JW20) GO TO 740                                          E4500
      AREA=AREA-.5*DX*(Y1(J)+Y1(J-1))                                   E4510
  740 CONTINUE                                                          E4520
      AREA=2.*AREA                                                      E4530
      IF (HSPAN.LE.RMAX) AREA=RMAX**2/PIR                               E4540
      ARR=2./AREA                                                       E4550
      CLA=ALA*ARR                                                       E4560
      CLS=ALS*ARR                                                       E4570
      CLANS=ALANS*ARR                                                   E4580
      CLSNS=ALSNS*ARR                                                   E4590
      CAINTO=AINTO*ARR                                                  E4600
      CSMA=SMA*ARR                                                      E4610
      CMA=AMA*ARR                                                       E4620
      CMS=AMS*ARR                                                       E4630
      CMANS=AMANS*ARR                                                   E4640
      CMSNS=AMSNS*ARR                                                   F4650
      PRINT 1140, ALA,ALS,AMA                                           E4660
```

```
      PRINT 1150, AMS,XBARA,XBARS,ALANS,ALSNS,AMANS,AMSNS,XBARAN,XBARSN,   E4670
                                                                          E4680
     1AINTO                                                               E4690
      PRINT 1160, SMA,CLA,CLS,CLANS,CLSNS,CAINTO,CSMA,CMA,CMS,CMANS       E4700
      PRINT 1170, CMSNS,AREA                                              E4710
C                                                                         E4720
C     PART 5   BODY SURFACE PRESSURE COEFFICIENTS                         E4730
C                                                                         E4740
      PRINT 1180                                                          E4750
      IF (ABS(SNALP).LT.1.E-06) GO TO 770                                 E4760
      IF (ABS(OMEGAD).GT.1.E-06) GO TO 760                                E4770
      PRINT 1190                                                          E4780
      IF (IVOR.EQ.0) GO TO 750                                            E4790
      PRINT 1200                                                          E4800
      GO TO 780                                                           E4810
  750 PRINT 1210                                                          E4820
      GO TO 780                                                           E4830
  760 CHK=SNO-1.                                                          E4840
      IF (ABS(CHK).LT.1.E-06) PRINT 1220                                  E4850
      CHK=1.+SNO                                                          E4860
      IF (ABS(CHK).LT.1.E-06) PRINT 1230                                  E4870
      IF (IVOR.EQ.0) GO TO 770                                            E4880
      PRINT 1240                                                          E4890
      PRINT 1250                                                          E4900
      GO TO 780                                                           E4910
  770 PRINT 1260                                                          E4920
  780 J2P1=J2+1                                                           E4930
      J3M1=J3-1                                                           E4940
      ALAMB=1.                                                            E4950
      K=1                                                                 E4970
      DO 1030 J=J2P1,J3M1                                                 E4980
      JP1=J+1                                                             E4990
      JM1=J-1                                                             E5000
      JM2=J-2                                                             E5010
      JM3=J-3                                                             E5011
      JG=J-JW1O+3                                                         E5020
      ACHKK=ALAMB                                                         E5030
      ALAMB=BETASQ-.5*GP1DXR*(PHI(JP1,K)-PHI(JM1,K))-GAMP1*FUN4(J)        E5040
      IF (ALAMB.LE.0) GO TO 790                                           E5050
      AA=.5*PIR*ALOG(R(J)/RW(K))                                          E5060
      PHIM1=PHI(JM1,K)+AA*SPRIME(JM1)                                     E5070
      IF (J.EQ.JS.AND.ABS(R(J)-R(J-1)).LT.1.E-06) PHIM1=PHI(JM1,K)        E5080
      PHIP1=PHI(JP1,K)+AA*SPRIME(JP1)                                     E5090
      U=.5*DXR*(PHIP1-PHIM1)
```

```
      IF (ACHKK.GE.0.) GO TO 800                                        E5100
      PHIMO=PHI(J,1)+AA*SPRIME(J)                                       E5110
      U=DXR*(PHIMO-PHIM1)                                               E5120
      GO TO 800                                                         E5130
  790 ALAMB=BETASQ-GP1DXR*(PHI(J,K)-PHI(JM1,K))-GAMP1*FUN4(J)           E5140
      AA=.5*PIR*ALOG(R(J)/RW(K))                                        E5150
      PHIMO=PHI(J,K)+AA*SPRIME(J)                                       E5160
      PHIM1=PHI(JM1,K)+AA*SPRIME(JM1)                                   E5170
      PHIM2=PHI(JM2,K)+AA*SPRIME(JM2)                                   E5180
      U=.5*DXR*(3.*PHIMO-4.*PHIM1+PHIM2)                                E5190
      IF (J.NE.JS.OR.ABS(R(J)-R(JM1)).GE.1.E-06) GO TO 800              E5200
      PHIM1=PHI(JM1,K)                                                  E5210
      U=DXR*(PHIMO-PHIM1)                                               E5220
  800 V=.5*DXR*(R(JP1)-R(JM1))                                          E5230
      IF (IW.EQ.0) GO TO 850                                            E5240
      IF (J.LT.JW10.OR.J.GT.JW3) GO TO 850                              E5250
      IF (J.GT.JW10) GO TO 810                                          E5260
      ACHKK=ALAMB                                                       E5270
      GO TO 820                                                         E5280
  810 ACHKK=ALAMBU                                                      E5290
  820 JGM1=JG-1                                                         E5310
      JGP1=JG+1                                                         E5320
      JGM2=JG-2                                                         E5330
      ALAMBU=BETASQ-.5*GP1DXR*(PHIU(JGP1,K)-PHIU(JGM1,K))+GAMP1*FUN4(J) E5340
      PHIM1=PHIU(JGM1,K)+AA*SPRIME(JM1)                                 E5350
      IF (ALAMBU.LE.0.) GO TO 840                                       E5360
      IF (ACHKK.LT.0.) GO TO 830                                        E5370
      PHIP1=PHIU(JGP1,K)+AA*SPRIME(JP1)                                 E5380
      UO=.5*DXR*(PHIP1-PHIM1)                                           E5390
      GO TO 860                                                         E5400
  830 PHIMO=PHIU(JG,K)+AA*SPRIME(J)                                     E5410
      UO=DXR*(PHIMO-PHIM1)                                              E5420
      GO TO 860                                                         E5430
  840 ALAMBU=BETASQ-.5*GP1DXR*(PHIU(JG,K)-PHIU(JGM2,K))-GAMP1*FUN4(J)   E5440
      PHIMO=PHIU(JG,K)+AA*SPRIME(J)                                     E5450
      PHIM2=PHIU(JGM2,K)+AA*SPRIME(JM2)                                 E5460
      UO=.5*DXR*(3.*PHIMO-4.*PHIM1+PHIM2)                               E5470
      GO TO 860                                                         E5480
  850 UO=U                                                              E5490
      ALAMBU=ALAMB                                                      E5500
  860 IF (IVOR.EQ.0.OR.J.LT.JW10.OR.J.GT.JW2) GO TO 880                 E5510
      IF (J.GT.JCHCK) GO TO 870                                         E5520
      HB=Y2(J)+R(J)**2/Y2(J)                                            E5530
```

```
      HBP=(1.-(R(J)/Y2(J))**2)*Y2PRM(J)+PIR*SPRIME(J)/Y2(J)                    E5540
      FUNO(J)=FUNO(J)+SNALP*(HBP*(VLAM(JG)**2+VTAU(JG)**2)+2.*HB*(VLAM(J      E5550
     1G)*VLAMP(JG)+VTAU(JG)*VTAUP(JG)))/(1.-VTAU(JG)**2)*VTAU(JG)*FUNA(J      E5560
     2)+SNALP*HB*(VLAM(JG)**2+VTAU(JG)**2)/(1.-VTAU(JG)**2)*VTAU(JG)*FUN      E5570
     3B(J)                                                                   E5580
      GO TO 880                                                              E5590
  870 FUNO(J)=FUNO(J)+SNALP*GAN*(((1.-VTAU(JG))/((1.-VTAU(JG))**2+VLAM(J     E5600
     1G)**2)+1./(1.+VTAU(JG)))*VLAMP(JG)+VLAM(JG)*(1./((1.-VTAU(JG))**2+     E5610
     2VLAM(JG)**2)-1./(1.+VTAU(JG))**2)*VTAUP(JG))                           E5620
  880 UO=UO-FUNO(J)                                                          E5630
      U=U-FUNO(J)                                                            E5640
      DRDX=.5*DXR*(R(JP1)-R(JM1))                                            E5650
      ROY2J=1.                                                               E5660
      IF (Y2(J).GT.R(J).AND.J.NE.J2) ROY2J=R(J)/Y2(J)                        E5670
      UU=SNALP*(2.*ROY2J*DRDX+(1.-ROY2J**2)*Y2PRM(J))                        E5680
      IF (J.GT.JW2.AND.J.LE.JW3) UU= 2.*SNALP*ROY2J*DRDX                     E5681
      Y2JO=R(J)                                                              E5690
      IF (Y2(J).GT.R(J)) Y2JO=Y2(J)                                          E5700
      UU=UU*FUNA(J)+SNALP*Y2JO*(1.+ROY2J**2)*FUNB(J)                         E5710
      IF (IWING.LT.0.AND.J.GT.JMCK.AND.J.LE.JW3) UU=UU90D(JG)*SQRT(1.+DR     E5711
     1DX**2*4.)                                                              E5712
      U1=U+UU                                                                E5720
      U2=UO-UU                                                               E5730
      V1=V-SNALP                                                             E5740
      V2=V+SNALP                                                             E5750
      IF (J.LT.JW10) GO TO 890                                               E5760
      UU=SNALP*(-2.*ROY2J*DRDX+(1.+ROY2J**2)*Y2PRM(J))                       E5770
      IF (J.GT.JW2.AND.J.LE.JW3) UU=-2.*SNALP*ROY2J*DRDX                     E5771
      UU=UU*FUNA(J)+SNALP*Y2JO*(1.-ROY2J**2)*FUNB(J)                         E5780
      IF (IWING.LT.0.AND.J.GT.JMCK.AND.J.LE.JW3) UU=UU0D(JG)                 E5781
      U3=U+UU                                                                E5790
      U4=UO-UU                                                               E5800
      W3=-SNALP                                                              E5810
      W4=-SNALP                                                              E5820
      GO TO 900                                                              E5850
  890 U3=U                                                                   E5860
      U4=UO                                                                  E5870
      W3=SNALP                                                               E5880
      W4=SNALP                                                               E5890
  900 V3=V                                                                   E5920
      V4=V                                                                   E5930
      IF (ABS(SNALP).LT.1.E-06) GO TO 990                                    E5940
      IFLG=0                                                                 E5950
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      IF (ABS(OMEGAD).GT.1.E-06) GO TO 950                              E5960
      CP(J)=-2.*(U3+SNALP*W3)-V3**2-W3**2                               E5970
      CPO(J)=-2.*(U4+SNALP*W4)-V4**2-W4**2                              E5980
      CP1(J)=-2.*(U1+SNALP*V1)-V1**2                                    E5990
      CP2(J)=-2.*(U2-SNALP*V2)-V2**2                                    E6000
      IF (J.GE.JW10.AND.J.LE.JW2) GO TO 910                             E6010
      PRINT 1060, J,CP(J),CPO(J),CP1(J),CP2(J)                          E6020
      GO TO 1030                                                        E6030
  910 IF (IVOR.EQ.0) GO TO 1010                                         E6040
      CPX=CP(J)                                                         E6050
      CPOX=CPO(J)                                                       E6060
      CP1X=CP1(J)                                                       E6070
      CP2X=CP2(J)                                                       E6080
  920 HB=Y2(J)+R(J)**2/Y2(J)                                            E6090
      HBP=Y2PRM(J)*(1.-(R(J)/Y2(J))**2)+PIR/Y2(J)*SPRIME(J)             E6100
      L=JG                                                              E6110
      BNUM1=.5*(VLAM(L)+VTAU(L)**2/VLAM(L))                             E6120
      IF (J.GT.JCHCK) GO TO 930                                         E6130
      GAN=BNUM1*HB                                                      E6140
      DGANDX=BNUM1*HBP+HB*(.5*(1.-(VTAU(L)/VLAM(L))**2)*VLAMP(L)+VTAU(L)E6150
     1/VLAM(L)*VTAUP(L))                                                E6160
      DGANDX=DGANDX*FUNA(J)+GAN*FUNB(J)                                 E6170
      GAN=GAN*FUNA(J)                                                   E6180
      GO TO 940                                                         E6190
  930 GAN=GANO                                                          E6200
      DGANDX=0.                                                         E6210
  940 Y2N=2.*R(J)/HB                                                    E6220
      CNUM1=1.-VTAU(L)                                                  E6230
      CNUM2=1.+VTAU(L)                                                  E6240
      BNUM2=SQRT(1.-Y2N**2)                                             E6250
      CNUM3=BNUM2-VTAU(L)                                               E6260
      CNUM4=BNUM2+VTAU(L)                                               E6270
      BNUM3=Y2N**2/(BNUM2*HB)*VLAM(L)                                   E6280
      BNUM4=2.*VLAM(L)/(BNUM2*HB**2)*PIR                                E6290
      DNUM1=CNUM1**2+VLAM(L)**2                                         E6300
      DNUM2=CNUM2**2+VLAM(L)**2                                         E6310
      DNUM3=CNUM3**2+VLAM(L)**2                                         E6320
      DNUM4=CNUM4**2+VLAM(L)**2                                         E6330
      ENUM1=CNUM1**2-VLAM(L)**2                                         E6340
      ENUM2=CNUM2**2-VLAM(L)**2                                         E6350
      ENUM3=CNUM3**2-VLAM(L)**2                                         E6360
      ENUM4=CNUM4**2-VLAM(L)**2                                         E6370
      ARG1=2.*VLAM(L)*CNUM1                                             E6380
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      ARG2=2.*VLAM(L)*CNUM2                                                 E6390
      ARG3=2.*VLAM(L)*CNUM3                                                 E6400
      ARG4=2.*VLAM(L)*CNUM4                                                 E6410
      THETA1=ATAN2(ARG1,ENUM1)                                              E6420
      THETA2=-ATAN2(ARG2,ENUM2)                                             E6430
      THETA3=ATAN2(ARG3,ENUM3)                                              E6440
      THETA4=-ATAN2(ARG4,ENUM4)                                             E6450
      U1=U1+SNALP*(THETA1*DGANDX+2.*GAN/DNUM1*(CNUM1*VLAMP(L)+VLAM(L)*VT    E6460
     1AUP(L)))                                                              E6470
      U2=U2-SNALP*(THETA2*DGANDX+2.*GAN/DNUM2*(CNUM2*VLAMP(L)-VLAM(L)*VT    E6480
     1AUP(L)))                                                              E6490
      U3=U3+SNALP*(THETA3*DGANDX+2.*GAN/DNUM3*(CNUM3*VLAMP(L)-BNUM3*HBP+    E6500
     1VLAM(L)*VTAUP(L)+BNUM4*SPRIME(J)))                                    E6510
      U4=U4-SNALP*(THETA4*DGANDX+2.*GAN/DNUM4*(CNUM4*VLAMP(L)-BNUM3*HBP-    E6520
     1VLAM(L)*VTAUP(L)+BNUM4*SPRIME(J)))                                    E6530
      IF (ABS(OMEGAD).GT.1.E-06) GO TO 950                                  E6540
      CP(J)=-2.*(U3+SNALP*W3)-V3**2-W3**2                                   E6550
      CPO(J)=-2.*(U4+SNALP*W4)-V4**2-W4**2                                  E6560
      CP1(J)=-2.*(U1+SNALP*V1)-V1**2                                        E6570
      CP2(J)=-2.*(U2-SNALP*V2)-V2**2                                        E6580
      PRINT 1060, J,CP(J),CPO(J),CP1(J),CP2(J),CPX,CPOX,CP1X,CP2X           E6590
      GO TO 1030                                                            E6600
  950 CHK=SNO+1.                                                            E6610
      IF (ABS(CHK).GT.1.E-06) GO TO 970                                     E6620
      CP(J)=-2.*(U2-SNALP*V2)-V2**2                                         E6630
      IF (J.GE.JW10.AND.J.LE.JW2) GO TO 960                                 E6640
      GO TO 1000                                                            E6650
  960 IF (IVOR.EQ.0) GO TO 1000                                             E6660
      IF (IFLG.EQ.1) GO TO 1020                                             E6670
      IFLG=1                                                                E6680
      CPX=CP(J)                                                             E6690
      GO TO 920                                                             E6700
  970 CHK=SNO-1.                                                            E6710
      IF (ABS(CHK).GT.1.E-06) GO TO 990                                     E6720
      CP(J)=-2.*(U1+SNALP*V1)-V1**2                                         E6730
      IF (J.GE.JW10.AND.J.LE.JW2) GO TO 980                                 E6740
      GO TO 1000                                                            E6750
  980 IF (IVOR.EQ.0) GO TO 1000                                             E6760
      IF (IFLG.EQ.1) GO TO 1020                                             E6770
      IFLG=1                                                                E6780
      CPX=CP(J)                                                             E6790
      GO TO 920                                                             E6800
  990 CP(J)=-2.*U-V**2                                                      E6810
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```
 1000 PRINT 1060, J,CP(J)                                                       E6820
      GO TO 1030                                                                E6830
 1010 PRINT 1060, J,CP(J),CPO(J),CP1(J),CP2(J)                                  E6840
      GO TO 1030                                                                E6850
 1020 PRINT 1060, J,CP(J),CPX                                                   E6860
 1030 CONTINUE                                                                  E6870
      IF (ABS(AMINF).LT.1.E-08) AMINF=1.E-08                                    E6871
      CPSTAR=2.*(1.-SQRT(((GAMMA-1.)*AMINF**2+2.)/(GAMMA+1.)))/AMINF)           E6880
      PRINT 1270, CPSTAR                                                        E6890
C                                                                               E6900
C     PART 6   REMOTE TERMINAL OUTPUT                                           E6910
C                                                                               E6920
      BLK3=10HCP(J)                                                             E6930
      WRITE (7,1280) BLK3,J2P1,J3M1,1,(CP(J),J=J2P1,J3M1)                       E6940
      BLK4=10HCPO(J)                                                            E6950
      IF (IW.EQ.1) WRITE (7,1280) BLK4,J2P1,J3M1,1,(CPO(J),J=J2P1,J3M1)         E6960
      WRITE (7,1290) DPHIMX                                                     E6970
C                                                                               E6980
C     PART 7   WAVE DRAG                                                        E6990
C                                                                               E7000
      DRAG=0.                                                                   E7010
      J2P2=J2+2                                                                 E7020
      J3M3=J3-3                                                                 E7030
      DO 1050 J=J2P2,J3M3                                                       E7040
      JP1=J+1                                                                   E7050
      IF (IW.EQ.0) GO TO 1040                                                   E7060
      DRAG=DRAG+.39269908*(CP(J)+CP(JP1)+CPO(J)+CPO(JP1))*(R(J)+R(JP1))*        E7070
     1(R(JP1)-R(J))                                                             E7080
      GO TO 1050                                                                E7090
 1040 DRAG=DRAG+.78539816*(CP(J)+CP(JP1))*(R(J)+R(JP1))*(R(JP1)-R(J))           E7100
 1050 CONTINUE                                                                  E7110
      IF (IW.EQ.0) DRAG=DRAG+1.57079632*(CP(J2P1)*R(J2P2)**2+CP(J3M1)*(R        E7120
     1(J3)**2-R(J3-2)**2))                                                      E7130
      IF (IW.EQ.1) DRAG=DRAG+.78539816*((CP(J2P1)+CPO(J2P1))*R(J2P2)**2+        E7140
     1(CP(J3M1)+CPO(J3M1))*(R(J3)**2-R(J3-2)**2))                               E7150
      PRINT 1300, DRAG                                                          E7160
C                                                                               E7170
C     PART 8   PLOTTING INPUT                                                   E7180
C                                                                               E7190
      WRITE (1) IWALL,J1,J2,J3,J4,JW10,JW20,JW2,JW3,KM,CPSTAR,AMINF,RMAX        E7200
     1,HSPAN,SNALP,SNO,SFACTOR                                                  E7210
      WRITE (1) CPO,XW,RW,Y1,Y2,R,SLAS,CP,CP1,CP2                               E7220
      RETURN                                                                    E7230
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C                                                                       E7240
 1060 FORMAT (I4,8E16.8)                                                E7250
 1070 FORMAT (18H SUBROUTINE RESULT////36H SHOCK WAVE AND SONIC LINE LOC E7260
     1ATIONS///3X,1HJ,6X,5HXW(J),9X,9HSLAS(J,1),7X,9HSLAS(J,2),7X,9HSLAS E7270
     2(J,3),7X,9HSLAS(J,4),7X,9HSLAS(J,5),7X,9HSLAS(J,6)/)              E7280
 1080 FORMAT (I4,7E16.8)                                                E7290
 1090 FORMAT (///38H PRESSURE COEFFICIENTS AT GRID POINTS /51H   1 GENER E7300
     1AL POINTS ( COMPUTATIONAL APPROXIMATION )/54H   2 POINTS UNDER WIN E7310
     2G ( COMPUTATIONAL APPROXIMATION )/23H   3 POINTS ABOVE WING /22H   E7320
     3 4 POINTS UNDER WING)                                             E7330
 1100 FORMAT (/3I5/(8E16.8))                                            E7340
 1110 FORMAT (//3I5/(8E16.8))                                           E7350
 1120 FORMAT (///34H VELOCITY POTENTIAL AT GRID POINTS/19H   1 GENERAL P E7360
     1OINTS/22H   2 POINTS UNDER WING)                                  E7370
 1130 FORMAT (///24H AXIAL LIFT DISTRIBUTION/37H   CP(J)  = LIFT MINUS V E7380
     1ORTEX EFFECT /16H   CPO(J) = LIFT/52H   CP1(J) = LIFT MINUS THICKN E7390
     2ESS AND VORTEX EFFECTS /39H   CP2(J) = LIFT MINUS THICKNESS EFFECT E7400
     3/28H   AINT   = THICKNESS EFFECT/26H   DCP    = VORTEX EFFECT //3X E7410
     4,1HJ,6X,5HCP(J),11X,6HCPO(J),10X,6HCP1(J),10X,6HCP2(J),11X,4HAINT, E7420
     513X,3HDCP/)                                                       E7430
 1140 FORMAT (///16H LIFT AND MOMENT/59H   AL     = LIFT, AM = MOMENT, X E7440
     1BAR = MOMENT ARM ABOUT NOSE/45H   A      = ATTACHED FLOW, S = SEPA E7450
     2RATED FLOW/25H   NS     = NEGLECT SHOCK/42H   AINTO  = SHOCK LIFT  E7460
     3, SMA = VORTEX LIFT/29H   AREA   = EXPOSED WING AREA/46H          E7470
     4     OR MAXIMUM CROSS-SECTIONAL AREA///11H   ALA    =,E16.8//11H  E7480
     5 ALS    =,E16.8//11H   AMA    =,E16.8//)                          E7490
 1150 FORMAT (11H   AMS    =,E16.8//11H   XBARA  =,E16.8//11H   XBARS  = E7500
     1,E16.8//11H   ALANS  =,E16.8//11H   ALSNS  =,E16.8//11H   AMANS  = E7510
     2,E16.8//11H   AMSNS  =,E16.8//11H   XBARAN =,E16.8//11H   XBARSN = E7520
     3,E16.8//11H   AINTO  =,E16.8//)                                   E7530
 1160 FORMAT (11H   SMA    =,E16.8//11H   CLA    =,E16.8//11H   CLS    = E7540
     1,E16.8//11H   CLANS  =,E16.8//11H   CLSNS  =,E16.8//11H   CAINTO = E7550
     2,E16.8//11H   CSMA   =,E16.8//11H   CMA    =,E16.8//11H   CMS    = E7560
     3,E16.8//11H   CMANS  =,E16.8//)                                   E7570
 1170 FORMAT (11H   CMSNS  =,E16.8//11H   AREA   =,E16.8)               E7580
 1180 FORMAT (///36H BODY SURFACE PRESSURE COEFFICIENTS )                E7590
 1190 FORMAT (48H   CP(J)  - OMEGA =  +0 DEGREES ( LEEWARD SIDE )/49H   E7600
     1CPO(J) - OMEGA =  -0 DEGREES ( WINDWARD SIDE )/32H   CP1(J) - OMEG E7610
     2A = +90 DEGREES /32H   CP2(J) - OMEGA = -90 DEGREES )             E7620
 1200 FORMAT (53H   CPX,CPOX,CP1X AND CP2X - VORTEX EFFECTS NEGLECTED // E7630
     1/3X,1HJ,7X,5HCP(J),10X,6HCPO(J),9X,6HCP1(J),10X,6HCP2(J),13X,3HCPX E7640
     2,13X,4HCPOX,12X,4HCP1X,12X,4HCP2X/)                               E7650
 1210 FORMAT (//3X,1HJ,7X,5HCP(J),10X,6HCPO(J),9X,6HCP1(J),10X,6HCP2(J)// E7660
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     1)                                                                  E7670
1220 FORMAT (32H    CP(J)  - OMEGA = +90 DEGREES )                      E7680
1230 FORMAT (32H    CP(J)  - OMEGA = -90 DEGREES )                      E7690
1240 FORMAT (34H    CPX  -VORTEX EFFECTS NEGLECTED )                    E7700
1250 FORMAT (//3X,1HJ,7X,5HCP(J),10X,3HCPX/)                            E7710
1260 FORMAT (//3X,1HJ,7X,5HCP(J)/)                                      E7720
1270 FORMAT (/8H CPSTAR=,E16.8)                                         E7730
1280 FORMAT (1X1A10,3I5/(7E16.8))                                       E7740
1290 FORMAT (8H DPHIMX=E16.8)                                           E7750
1300 FORMAT (/6H DRAG=E16.8/)                                           E7760
     END                                                                E7770-
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```
      OVERLAY (DICK,2,0)                                                F    0
      PROGRAM TWOO                                                      F   10
      DIMENSION CPO(120), XW(120), RW(100), Y1(120), Y2(120), R(120), SL F   20
     1AS(120,6), CP(120), CP1(120), CP2(120)                            F   30
      DIMENSION TMP1(200), TMP2(200), TMP3(200)                         F   40
      DIMENSION NAME(6), LBLE1(8), LBLE2(8)                             F   50
      DATA NAME/3HM =,3HF =,3HH =,7HALPHA =,7HOMEGA =,4HDEG./           F   60
      COMMON /CALLP/ NREAD,NCASES                                       F   70
      YTIC=-1.                                                          F   80
      XTIC=-1.                                                          F   90
      YDV=10.                                                           F  100
      XDV=10.                                                           F  110
      NREAD=NREAD+1                                                     F  120
      REWIND 1                                                          F  130
      RAD=57.29577951                                                   F  140
      READ (1) IWALL,J1,J2,J3,J4,JW10,JW20,JW2,JW3,KM,CPSTAR,AMINF,RMAX, F  150
     1HSPAN,SNALP,SNO,SFACTOR                                           F  160
      READ (1) CPO,XW,RW,Y1,Y2,R,SLAS,CP,CP1,CP2                        F  170
      F=.5/RMAX                                                         F  180
      ALPHA=ASIN(SNALP)                                                 F  190
      ALPHA=ALPHA*RAD                                                   F  200
      J2P1=J2+1                                                         F  210
      J3M1=J3-1                                                         F  220
      IF (ABS(ALPHA).LT.1.E-08) ALPHA=0.                                F  230
      OMEGA=ASIN(SNO)                                                   F  240
      OMEGA=OMEGA*RAD                                                   F  250
      CALL PSEUDO                                                       F  260
      CALL LEROY                                                        F  270
      CALL CALPLT (2.,2.5,-3)                                           F  280
      YSHIFT=1.0                                                        F  290
      IF (SNO.LT.-1.E-06) YSHIFT=7.5                                    F  300
      CALL CALPLT (0.,YSHIFT,-3)                                        F  310
      ENCODE (30,240,LBLE1(1) )NAME(1),AMINF,NAME(2),F,NAME(3),HSPAN    F  320
      ENCODE (40,250,LBLE2(1) )NAME(4),ALPHA,NAME(6),NAME(5),OMEGA,NAME( F  330
     16)                                                                F  340
C                                                                       F  350
C     FIGURE 1 - PLOT BODY                                              F  360
C                                                                       F  370
      NCOUNT=0                                                          F  380
      DO 10 J=J2,J3                                                     F  390
      NCOUNT=NCOUNT+1                                                   F  400
      TMP1(NCOUNT)=XW(J)                                                F  410
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      TMP2(NCOUNT)=R(J)                                                 F 420
      TMP3(NCOUNT)=-R(J)                                                F 430
   10 CONTINUE                                                          F 440
      TMP1(NCOUNT+1)=TMP1(1)                                            F 450
      TMP2(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 460
      TMP3(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 470
      TMP1(NCOUNT+2)=SFACTOR                                            F 480
      TMP2(NCOUNT+2)=TMP1(NCOUNT+2)                                     F 490
      TMP3(NCOUNT+2)=TMP1(NCOUNT+2)                                     F 500
      CALL LINE (TMP1,TMP2,NCOUNT,1,+0,3,.07)                           F 510
      CALL LINE (TMP1,TMP3,NCOUNT,1,+0,3,.07)                           F 520
      IF (HSPAN.LT.RMAX) GO TO 80                                       F 530
      IF (ABS(SNO).LT.1.E-06) GO TO 20                                  F 540
      GO TO 80                                                          F 550
C                                                                       F 560
C     FIGURE 1 - PLOT  Y2(J)  VERSUS  XW(J)                             F 570
C                                                                       F 580
   20 NCOUNT=0                                                          F 590
      DO 30 J=JW10,JW3                                                  F 600
      NCOUNT=NCOUNT+1                                                   F 610
      TMP1(NCOUNT)=XW(J)                                                F 620
      TMP2(NCOUNT)=Y2(J)                                                F 630
   30 CONTINUE                                                          F 640
      TMP1(NCOUNT+1)=0.                                                 F 650
      TMP2(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 660
      TMP3(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 670
      TMP1(NCOUNT+2)=SFACTOR                                            F 680
      TMP2(NCOUNT+2)=TMP1(NCOUNT+2)                                     F 690
      TMP3(NCOUNT+2)=TMP1(NCOUNT+2)                                     F 700
      CALL LINE (TMP1,TMP2,NCOUNT,1,+0,3,.07)                           F 710
      DO 40 J=1,NCOUNT                                                  F 720
   40 TMP2(J)=-TMP2(J)                                                  F 730
      CALL LINE (TMP1,TMP2,NCOUNT,1,+0,3,.07)                           F 740
      IF (JW3.GT.JW2) GO TO 50                                          F 750
C                                                                       F 760
C     DRAW LINE IF  JW2=JW3                                             F 770
C                                                                       F 780
      TMP1(1)=XW(JW3)/SFACTOR                                           F 790
      TMP2(1)=Y2(JW3)/SFACTOR                                           F 800
      TMP1(2)=XW(JW3)/SFACTOR                                           F 810
      TMP2(2)=R(JW3)/SFACTOR                                            F 820
      CALL DRAW (TMP1,TMP2,2)                                           F 830
      TMP2(1)=-TMP2(1)                                                  F 840
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      TMP2(2)=-TMP2(2)                                                  F 850
      CALL DRAW (TMP1,TMP2,2)                                           F 860
      GO TO 80                                                          F 870
C                                                                       F 880
C     PLOT  Y1(J)  VERSUS  XW(J)                                        F 890
C                                                                       F 900
   50 NCOUNT=0                                                          F 910
      DO 60 J=JW20,JW3                                                  F 920
      NCOUNT=NCOUNT+1                                                   F 930
      TMP1(NCOUNT)=XW(J)                                                F 940
      TMP2(NCOUNT)=Y1(J)                                                F 950
   60 CONTINUE                                                          F 960
      TMP1(NCOUNT+1)=0.                                                 F 970
      TMP2(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 980
      TMP3(NCOUNT+1)=TMP1(NCOUNT+1)                                     F 990
      TMP1(NCOUNT+2)=SFACTOR                                            F1000
      TMP2(NCOUNT+2)=TMP1(NCOUNT+2)                                     F1010
      TMP3(NCOUNT+2)=TMP1(NCOUNT+2)                                     F1020
      CALL LINE (TMP1,TMP2,NCOUNT,1,+0,3,.07)                           F1030
      DO 70 J=1,NCOUNT                                                  F1040
   70 TMP2(J)=-TMP2(J)                                                  F1050
      CALL LINE (TMP1,TMP2,NCOUNT,1,+0,3,.07)                           F1060
C                                                                       F1070
C     FIGURE 1 - PLOT  SLAS(J,1)  VERSUS  XW(J)                         F1080
C                                                                       F1090
   80 DO 120 II=1,6                                                     F1110
      NCOUNT=0                                                          F1120
      DO 90 J=J1,J4                                                     F1130
      IF (SLAS(J,II).LE.0.) GO TO 90                                    F1140
      IF (SLAS(J,II).GT.YSHIFT.AND.SNO.LT.-1.E-06) GO TO 90             F1141
      NCOUNT=NCOUNT+1                                                   F1150
      TMP1(NCOUNT)=XW(J)                                                F1160
      TMP2(NCOUNT)=SLAS(J,II)                                           F1170
   90 CONTINUE                                                          F1190
      TMP1(NCOUNT+1)=0.                                                 F1200
      TMP2(NCOUNT+1)=TMP1(NCOUNT+1)                                     F1210
      TMP3(NCOUNT+1)=TMP1(NCOUNT+1)                                     F1220
      TMP1(NCOUNT+2)=SFACTOR                                            F1230
      TMP2(NCOUNT+2)=TMP1(NCOUNT+2)                                     F1240
      TMP3(NCOUNT+2)=TMP1(NCOUNT+2)                                     F1250
      IF (SNO.GT.-1.E-06) GO TO 110                                     F1260
      DO 100 J=1,NCOUNT                                                 F1270
  100 TMP2(J)=-TMP2(J)                                                  F1280
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  110 IF (NCOUNT.EQ.0) GO TO 130                                                F1290
      CALL LINE (TMP1,TMP2,NCOUNT,1,-1,4,.07)                                   F1300
  120 CONTINUE                                                                  F1310
C                                                                               F1320
  130 YSHFTN=-YSHIFT-1.                                                         F1350
      YSHFT1=YSHFTN-.25                                                         F1360
      YSHFT2=YSHFTN-.50                                                         F1370
      YSHFT3=YSHFTN-.75                                                         F1380
      CALL NOTATE (0.,YSHFT1,.14,25HSONIC LINE AND SHOCK WAVE,0.,25)            F1390
      CALL NOTATE (0.,YSHFT2,.14,LBLE1(1),0.,30)                                F1400
      CALL NOTATE (0.,YSHFT3,.14,LBLE2(1),0.,40)                                F1410
      IF (ABS(SNO).LT.1.E-06) GO TO 140                                         F1420
      TMP1(1)=XW(JW10)/SFACTOR                                                  F1430
      TMP1(2)=XW(JW3)/SFACTOR                                                   F1440
      TMP2(1)=0.                                                                F1450
      TMP2(2)=TMP2(1)                                                           F1460
      CALL DRAW (TMP1,TMP2,2)                                                   F1470
  140 IF (IWALL.EQ.0) GO TO 150                                                 F1480
      TMP1(1)=-1./SFACTOR                                                       F1490
      TMP1(2)=+2./SFACTOR                                                       F1500
      TMP2(1)=RW(KM)/SFACTOR                                                    F1510
      TMP2(2)=TMP2(1)                                                           F1520
      IF (SNO.LT.-1.E-06) TMP2(1)=-RW(KM)/SFACTOR                               F1530
      TMP2(2)=TMP2(1)                                                           F1540
      CALL DRAW (TMP1,TMP2,2)                                                   F1550
  150 CALL NFRAME                                                               F1560
      CALL CALPLT (2.,2.5,-3)                                                   F1570
C                                                                               F1580
C                                                                               F1590
      XPG=5.                                                                    F1600
      YPG=8.                                                                    F1610
      TOPBND=-.8                                                                F1620
      BOTBND=+.8                                                                F1630
      SKIP=4.                                                                   F1640
      SCF=+.2                                                                   F1650
      YMOVE=SKIP-CPSTAR/SCF                                                     F1660
      IF (ALPHA.EQ.0.) GO TO 200                                                F1670
      IF (ABS(SNO).GT.1.E-06) GO TO 200                                         F1680
C                                                                               F1690
C     FIGURE 3 - CP VERSUS  X                                                   F1700
C                                                                               F1710
      NCOUNT=0                                                                  F1720
      DO 160 J=J2P1,J3M1                                                        F1730
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```
      NCOUNT=NCOUNT+1                                                    F1740
      TMP1(NCOUNT)=XW(J)                                                 F1750
      TMP2(NCOUNT)=CP(J)                                                 F1760
      TMP3(NCOUNT)=CPO(J)                                                F1770
      IF (TMP2(NCOUNT).LT.TOPBND) TMP2(NCOUNT)=TOPBND                    F1780
      IF (TMP3(NCOUNT).LT.TOPBND) TMP3(NCOUNT)=TOPBND                    F1790
      IF (TMP2(NCOUNT).GT.BOTBND) TMP2(NCOUNT)=BOTBND                    F1800
      IF (TMP3(NCOUNT).GT.BOTBND) TMP3(NCOUNT)=BOTBND                    F1810
  160 CONTINUE                                                           F1820
      TMP1(NCOUNT+1)=0.                                                  F1830
      TMP1(NCOUNT+2)=SCF                                                 F1840
      TMP2(NCOUNT+1)=BOTBND                                              F1850
      TMP3(NCOUNT+1)=TMP2(NCOUNT+1)                                      F1860
      TMP2(NCOUNT+2)=-SCF                                                F1870
      TMP3(NCOUNT+2)=TMP2(NCOUNT+2)                                      F1880
      CALL AXES (0.0,0.0,0.,XPG,TMP1(NCOUNT+1),TMP1(NCOUNT+2),XTIC,XDV,1 F1890
     1HX,.14,-1)                                                         F1900
      CALL AXES (-.5,0.,90.,YPG,TMP2(NCOUNT+1),TMP2(NCOUNT+2),YTIC,YDV,2 F1910
     1HCP,.14,+2)                                                        F1920
C                                                                        F1930
C     DRAW LINE FOR CPSTAR                                               F1940
C                                                                        F1950
      CALL CALPLT (-.500,YMOVE,-3)                                       F1960
      CALL CALPLT (.5,0.,2)                                              F1970
      CALL CALPLT (+.500,-YMOVE,-3)                                      F1980
      CALL LINE (TMP1,TMP2,NCOUNT,1,+1,3,.08)                            F1990
      CALL LINE (TMP1,TMP3,NCOUNT,1,+1,4,.07)                            F2000
      IF (HSPAN.LT.RMAX) GO TO 170                                       F2010
C                                                                        F2020
C     DRAW LINES FOR  JW10  AND  JW3                                     F2030
C                                                                        F2040
      TMP1(1)=XW(JW10)/SCF                                               F2050
      TMP1(2)=TMP1(1)                                                    F2060
      TMP2(1)=0.                                                         F2070
      TMP2(2)=.5                                                         F2080
      CALL DRAW (TMP1,TMP2,2)                                            F2090
      TMP1(1)=XW(JW3)/SCF                                                F2100
      TMP1(2)=TMP1(1)                                                    F2110
      CALL DRAW (TMP1,TMP2,2)                                            F2120
      IF (JW2.EQ.JW3) GO TO 170                                          F2130
      TMP1(1)=XW(JW20)/SCF                                               F2140
      TMP1(2)=TMP1(1)                                                    F2150
      CALL DRAW (TMP1,TMP2,2)                                            F2160
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  170 CONTINUE                                                          F2170
      CALL NOTATE (0.,-1.25,.14,26HBODY PRESSURE DISTRIBUTION,0.,26)    F2180
      CALL NOTATE (0.,-1.50,.14,13HIN WING PLANE,0.,13)                 F2190
      CALL NOTATE (0.,-1.75,.14,LBLE1(1),0.,30)                         F2200
      CALL NOTATE (0.,-2.00,.14,LBLE2(1),0.,40)                         F2210
      CALL NFRAME                                                       F2220
      CALL CALPLT (2.,2.5,-3)                                           F2230
C                                                                       F2240
C     FIGURE 2  -  CP  VERSUS  X                                        F2250
C                                                                       F2260
      NCOUNT=0                                                          F2270
      DO 180 J=J2P1,J3M1                                                F2280
      NCOUNT=NCOUNT+1                                                   F2290
      TMP1(NCOUNT)=XW(J)                                                F2300
      TMP2(NCOUNT)=CP1(J)                                               F2310
      TMP3(NCOUNT)=CP2(J)                                               F2320
      IF (TMP2(NCOUNT).LT.TOPBND) TMP2(NCOUNT)=TOPBND                   F2330
      IF (TMP3(NCOUNT).LT.TOPBND) TMP3(NCOUNT)=TOPBND                   F2340
      IF (TMP2(NCOUNT).GT.BOTBND) TMP2(NCOUNT)=BOTBND                   F2350
      IF (TMP3(NCOUNT).GT.BOTBND) TMP3(NCOUNT)=BOTBND                   F2360
  180 CONTINUE                                                          F2370
      TMP1(NCOUNT+1)=0.                                                 F2380
      TMP1(NCOUNT+2)=SCF                                                F2390
      TMP2(NCOUNT+1)=BOTBND                                             F2400
      TMP3(NCOUNT+1)=TMP2(NCOUNT+1)                                     F2410
      TMP2(NCOUNT+2)=-SCF                                               F2420
      TMP3(NCOUNT+2)=TMP2(NCOUNT+2)                                     F2430
      CALL AXES (0.0,0.0,0.,XPG,TMP1(NCOUNT+1),TMP1(NCOUNT+2),XTIC,XDV,1 F2440
                                                                        F2450
     1HX,.14,-1)                                                        F2460
      CALL AXES (-.5,0.,90.,YPG,TMP2(NCOUNT+1),TMP2(NCOUNT+2),YTIC,YDV,2 F2470
     1HCP,.14,+2)                                                       F2480
C                                                                       F2490
C     DRAW LINE FOR CPSTAR                                              F2500
C                                                                       F2510
      CALL CALPLT (-.500,YMOVE,-3)                                      F2520
      CALL CALPLT (.5,0.,2)                                             F2530
      CALL CALPLT (+.500,-YMOVE,-3)                                     F2540
      CALL LINE (TMP1,TMP2,NCOUNT,1,+1,3,.08)                           F2550
      CALL LINE (TMP1,TMP3,NCOUNT,1,+1,4,.07)                           F2560
      IF (HSPAN.LT.RMAX) GO TO 190                                      F2570
C                                                                       F2580
C     DRAW LINES FOR  JW10  AND  JW3                                    F2590
C
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      TMP1(1)=XW(JW10)/SCF                                                    F2600
      TMP1(2)=TMP1(1)                                                         F2610
      TMP2(1)=0.                                                              F2620
      TMP2(2)=.5                                                              F2630
      CALL DRAW (TMP1,TMP2,2)                                                 F2640
      TMP1(1)=XW(JW3)/SCF                                                     F2650
      TMP1(2)=TMP1(1)                                                         F2660
      CALL DRAW (TMP1,TMP2,2)                                                 F2670
      IF (Jw2.EQ.JW3) GO TO 190                                               F2680
      TMP1(1)=XW(JW20)/SCF                                                    F2690
      TMP1(2)=TMP1(1)                                                         F2700
      CALL DRAW (TMP1,TMP2,2)                                                 F2710
  190 CONTINUE                                                                F2720
      CALL NOTATE (0.,-1.25,.14,26HBODY PRESSURE DISTRIBUTION,0.,26)          F2730
      CALL NOTATE (0.,-1.50,.14,17HIN SYMMETRY PLANE,0.,17)                   F2740
      CALL NOTATE (0.,-1.75,.14,LBLE1(1),0.,30)                               F2750
      CALL NOTATE (0.,-2.00,.14,LBLE2(1),0.,40)                               F2760
      CALL NFRAME                                                             F2770
      CALL CALPLT (2.,2.5,-3)                                                 F2780
      GO TO 230                                                               F2790
C                                                                             F2800
C     FIGURE 4  -  CP VERSUS  X                                               F2810
C                                                                             F2820
  200 NCOUNT=0                                                                F2830
      DO 210 J=J2P1,J3M1                                                      F2840
      NCOUNT=NCOUNT+1                                                         F2850
      TMP1(NCOUNT)=XW(J)                                                      F2860
      TMP2(NCOUNT)=CP(J)                                                      F2870
      IF (TMP2(NCOUNT).LT.TOPBND) TMP2(NCOUNT)=TOPBND                         F2880
      IF (TMP2(NCOUNT).GT.BOTBND) TMP2(NCOUNT)=BOTBND                         F2890
  210 CONTINUE                                                                F2900
      TMP1(NCOUNT+1)=0.                                                       F2910
      TMP1(NCOUNT+2)=SCF                                                      F2920
      TMP2(NCOUNT+1)=BOTBND                                                   F2930
      TMP3(NCOUNT+1)=TMP2(NCOUNT+1)                                           F2940
      TMP2(NCOUNT+2)=-SCF                                                     F2950
      TMP3(NCOUNT+2)=TMP2(NCOUNT+2)                                           F2960
      CALL AXES (0.0,0.0,0.,XPG,TMP1(NCOUNT+1),TMP1(NCOUNT+2),XTIC,XDV,1      F2970
     1HX,.14,-1)                                                              F2980
      CALL AXES (-.5,0.,90.,YPG,TMP2(NCOUNT+1),TMP2(NCOUNT+2),YTIC,YDV,2      F2990
     1HCP,.14,+2)                                                             F3000
C                                                                             F3010
C     DRAW LINE FOR CPSTAR                                                    F3020
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C                                                                       F3030
      CALL CALPLT (-.500,YMOVE,-3)                                      F3040
      CALL CALPLT (.5,0.,2)                                             F3050
      CALL CALPLT (+.500,-YMOVE,-3)                                     F3060
      CALL LINE (TMP1,TMP2,NCOUNT,1,+1,3,.08)                           F3070
      IF (HSPAN.LT.RMAX) GO TO 220                                      F3080
C                                                                       F3090
C     DRAW LINES FOR  JW10  AND  JW3                                    F3100
C                                                                       F3110
      TMP1(1)=XW(JW10)/SCF                                              F3120
      TMP1(2)=TMP1(1)                                                   F3130
      TMP2(1)=0.                                                        F3140
      TMP2(2)=.5                                                        F3150
      CALL DRAW (TMP1,TMP2,2)                                           F3160
      TMP1(1)=XW(JW3)/SCF                                               F3170
      TMP1(2)=TMP1(1)                                                   F3180
      CALL DRAW (TMP1,TMP2,2)                                           F3190
      IF (JW2.EQ.JW3) GO TO 220                                         F3200
      TMP1(1)=XW(JW20)/SCF                                              F3210
      TMP1(2)=TMP1(1)                                                   F3220
      CALL DRAW (TMP1,TMP2,2)                                           F3230
  220 CONTINUE                                                          F3240
      CALL NOTATE (0.,-1.25,.14,26HBODY PRESSURE DISTRIBUTION,0.,26)    F3250
      CALL NOTATE (0.,-1.50,.14,LBLE1(1),0.,30)                         F3260
      CALL NOTATE (0.,-1.75,.14,LBLE2(1),0.,40)                         F3270
      CALL NFRAME                                                       F3280
  230 IF (NREAD.EQ.NCASES) CALL CALPLT (0.,0.,999)                      F3290
      IF (AMINF.GT.1.) J1=J1-2                                          F3300
      IF (AMINF.GT.1.) J4=J4+2                                          F3310
      RETURN                                                            F3320
C                                                                       F3330
  240 FORMAT (A3,F5.3,2X,A3,F6.3,2X,A3,F5.3,1X)                         F3340
  250 FORMAT (A7,F6.2,1X,A4,2X,A7,F6.2,1X,A4,2X)                        F3350
      END                                                               F3360
```

APPENDIX B

SAMPLE INPUT

The input for a sample case is presented in this appendix. This case involves a lifting configuration composed of a parabolic-arc body with a fineness ratio of 10 and a wing with a strake and a swept trailing edge. The flow is separated at the leading edge. The free-stream Mach number and angle of attack are $M_\infty = 0.98$ and $\alpha = 4^\circ$, respectively. The computation is made in the wing plane.

```
$NAME
J1      =  18,
J2      =  30,
J3      =  80,
J4      =  92,
J5      =  109,
FAC     =  0.12E+01,
KM      =  50,
RCOM    =  0.0,
A       =  0.1E+01,
B       =  0.1E+01,
IWALL   =  0,
P       =  0.0,
OMEGAD  =  0.0,
ALPHAD  =  0.4E+01,
HSPAN   =  0.3E+00,
AMINF   =  0.98E+00,
GAMMA   =  0.14E+01,
IR      =  0,
RC      =  0.4E+01,
RMAX    =  0.5E-01,
RN      =  0.2E+01,
JS      =  80,
RS      =  0.0,
JW1     =  42,
JW2     =  70,
JW3     =  78,
JWD     =  49,
IWING   =  2,
B1      =  0.2E+00,
B2      =  0.8391E+00,
DEL1    =  0.1E+00,
DEL     =  0.1E+00,
IVOR    =  1,
IDIR    =  4,
EPSI    =  0.5E-05,
SUB     =  0.13E+01,
SUP     =  0.85E+00,
IMAX    =  200,
SFACTOR =  0.5E+00,
$END
```

APPENDIX C

SAMPLE OUTPUT

In this appendix the output for the calculation described in appendix B is given. The printed output is given first, and then the plotted output is given in figures 7, 8, and 9.

SUBROUTINE START

ARRAYS AND PARAMETERS USED IN COMPUTATION
J = AXIAL GRID INDEX, K = RADIAL GRID INDEX

K	RW(K)	RWR(K)	AXOCR(K)	ABAR(K)
1	2.040816239E-02	0.	9.999917546-01	0.
2	4.16666667E-02	0.	9.99965627E-01	7.60416667E-01
3	6.38297872E-02	0.	9.99919340E-01	8.43971631E-01
4	8.69565217E-02	0.	9.99850317E-01	8.85869565E-01
5	1.11111111E-01	0.	9.99755645E-01	9.11111111E-01
6	1.36363636E-01	0.	9.99632021E-01	9.28030303E-01
7	1.62790698E-01	0.	9.99475697E-01	9.40155336E-01
8	1.90476190E-01	0.	9.99282406E-01	9.49404762E-01
9	2.19512195E-01	0.	9.99047288E-01	9.56639566E-01
10	2.50000000E-01	0.	9.98764792E-01	9.62500000E-01
11	2.82051282E-01	0.	9.98428564E-01	9.67365967E-01
12	3.15789474E-01	0.	9.98031314E-01	9.71491228E-01
13	3.51351351E-01	0.	9.97564659E-01	9.75051975E-01
14	3.88888889E-01	0.	9.97018939E-01	9.78174603E-01
15	4.23571429E-01	0.	9.96382985E-01	9.80952381E-01
16	4.70588235E-01	0.	9.95643855E-01	9.83455882E-01
17	5.15151515E-01	0.	9.94786511E-01	9.85735750E-01
18	5.62500000E-01	0.	9.93793421E-01	9.87847222E-01
19	6.12903226E-01	0.	9.92644090E-01	9.89813243E-01
20	6.66666667E-01	0.	9.91314482E-01	9.91666667E-01
21	7.24137931E-01	0.	9.89776311E-01	9.93431856E-01
22	7.85714286E-01	0.	9.87996180E-01	9.95125870E-01
23	8.51851852E-01	0.	9.85934520E-01	9.96779388E-01
24	9.23076923E-01	0.	9.83544279E-01	9.98397436E-01
25	1.00000000E+00	0.	9.80769303E-01	1.00000000E+00
26	1.08333333E+00	0.	9.77542327E-01	1.00160256E+00
27	1.17391304E+00	0.	9.73782477E-01	1.00322061E+00
28	1.27272727E+00	0.	9.69392160E-01	1.00487013E+00
29	1.38095238E+00	0.	9.64253190E-01	1.00656814E+00
30	1.50000000E+00	0.	9.58221963E-01	1.00833333E+00
31	1.63157895E+00	0.	9.51123465E-01	1.01018670E+00
32	1.77777778E+00	0.	9.42743860E-01	1.01215278E+00
33	1.94117647E+00	0.	9.32821463E-01	1.01426025E+00
34	2.12500000E+00	0.	9.21035739E-01	1.01654412E+00
35	2.33333333E+00	0.	9.06994502E-01	1.01904762E+00
36	2.57142857E+00	0.	8.90219313E-01	1.02182540E+00
37	2.84615385E+00	0.	8.70130103E-01	1.02494802E+00
38	3.16666667E+00	0.	8.46030955E-01	1.02850877E+00
39	3.54545455E+00	0.	8.17100964E-01	1.03263403E+00
40	4.00000000E+00	0.	7.82396930E-01	1.03750000E+00
41	4.55555556E+00	0.	7.40878518E-01	1.04336043E+00
42	5.25000000E+00	0.	6.91470507E-01	1.05059524E+00
43	6.14285714E+00	0.	6.33178544E-01	1.05980066E+00
44	7.33333333E+00	0.	5.65269540E-01	1.07196970E+00
45	9.00000000E+00	0.	4.87509156E-01	1.08888889E+00
46	1.15000000E+01	0.	4.00413440E-01	1.11413043E+00
47	1.56666667E+01	0.	3.05429309E-01	1.15602837E+00
48	2.40000000E+01	0.	2.04938687E-01	1.23956597E+00
49	4.90000000E+01	0.	1.02019786E-01	1.48979592E+00

K	CON1(K)	CON2(K)	CON3(K)	CON7(K)	CON8(K)	CON9(K)	CON10(K)	CON11(K)
1	1.00000000E+00	5.843057356-04	1.40291807E+00	0.	1.18417810E-09	5.80247270E-08	0.	2.43359323E-07
2	2.39583333E-01	4.70950280E-04	2.71267361E-01	0.	3.97852061E-09	9.54844948E-08	0.	8.17622013E-07
3	1.56028369E-01	5.12328572E-04	1.25748202E-01	0.	1.01569756E-08	1.59125950E-07	0.	2.08725045E-06
4	1.14130435E-01	5.58352779E-04	7.38421550E-02	0.	2.05438566E-08	2.36254385E-07	0.	4.22199418E-06
5	8.88888889E-02	6.09663161E-04	4.93827160E-02	0.	3.66246912E-08	3.29622221E-07	0.	7.52670569E-06
6	7.19696970E-02	6.67005328E-04	3.58700643E-02	0.	6.03525310E-08	4.42585227E-07	0.	1.24029916E-05
7	5.98066645E-02	7.31250517E-04	2.75935144E-02	0.	9.42962435E-08	5.79248353E-07	0.	1.93787319E-05
8	5.05952381E-02	8.03420886E-04	2.21442744E-02	0.	1.41838222E-07	7.44650663E-07	0.	2.91470389E-05
9	4.33604936E-02	8.84717427E-04	1.83684172E-02	0.	2.07439246E-07	9.45001007E-07	0.	4.26306434E-05
10	3.75000000E-02	9.76562500E-04	1.56250000E-02	0.	2.96994972E-07	1.18797989E-06	0.	6.10351562E-05
11	3.26340326E-02	1.08064135E-03	1.35839297E-02	0.	4.18318213E-07	1.48312821E-06	0.	8.59681801E-05
12	2.85087719E-02	1.19836256E-03	1.20229301E-02	0.	5.81794964E-07	1.84235072E-06	0.	1.19564134E-04
13	2.49480249E-02	1.33392022E-03	1.08056241E-02	0.	8.01282035E-07	2.28057195E-06	0.	1.64670714E-04
14	2.18253968E-02	1.48843543E-03	9.84189972E-03	0.	1.09534294E-06	2.81659613E-06	0.	2.25102892E-04
15	1.90476190E-02	1.66597251E-03	9.07029478E-03	0.	1.48896091E-06	3.47424213E-06	0.	3.05994951E-04
16	1.65441176E-02	1.87078699E-03	8.44777249E-03	0.	2.01593028E-06	4.28385185E-06	0.	4.14291928E-04
17	1.42692496E-02	2.10808622E-03	7.94354365E-03	0.	2.72222018E-06	5.28440776E-06	0.	5.59440103E-04
18	1.21527778E-02	2.38418579E-03	7.53520448E-03	0.	3.67074475E-06	6.52576844E-06	0.	7.54371285E-04
19	1.01867572E-02	2.70703103E-03	7.20625157E-03	0.	4.94818678E-06	8.07335738E-06	0.	1.01689719E-03
20	8.33333333E-03	3.08041975E-03	6.94444444E-03	0.	6.67484997E-06	1.00122750E-05	0.	1.37174211E-03
21	6.56814450E-03	3.53466303E-03	6.74070E59E-03	0.	9.01902618E-06	1.24548457E-05	0.	1.85369155E-03
22	4.87012987E-03	4.06731570E-03	6.58837915E-03	0.	1.22181716E-05	1.55504002E-05	0.	2.51054490E-03
23	3.22061192E-03	4.70419106E-03	6.48271320E-03	0.	1.66104781E-05	1.94992569E-05	0.	3.41360366E-03
24	1.60256410E-03	5.47074682E-03	6.42052926E-03	0.	2.26825272E-05	2.45727379E-05	0.	4.66146419E-03
25	2.64217094E-16	6.40000000E-03	6.40000000E-03	0.	3.11421800E-05	3.11421800E-05	0.	6.40000000E-03
26	-1.60256410E-03	7.53520448E-03	6.42052926E-03	0.	4.30316790E-05	3.97215498E-05	0.	8.84399706E-03
27	-3.22061192E-03	8.93364446E-03	6.48271320E-03	0.	5.99058946E-05	5.10309472E-05	0.	1.23112038E-02
28	-4.87012987E-03	1.06720848E-02	6.58837915E-03	0.	8.41180165E-05	6.60927272E-05	0.	1.72670141E-02
29	-6.56814450E-03	1.28547262E-02	6.74070659E-03	0.	1.19285944E-04	8.63794769E-05	0.	2.49244417E-02
30	-8.33333333E-03	1.56250000E-02	6.94444444E-03	0.	1.71069104E-04	1.14046069E-04	0.	3.51566360E-02
31	-1.01867572E-02	1.91834010E-02	7.20625157E-03	0.	2.48491094E-04	1.52300993E-04	0.	5.10671499E-02
32	-1.21527778E-02	2.38149672E-02	7.53520448E-03	0.	3.66246912E-04	2.06013888E-04	0.	7.52673699E-02
33	-1.42602496E-02	2.99325918E-02	7.94354365E-03	0.	5.48837019E-04	2.82734222E-04	0.	1.12791977E-01
34	-1.65441176E-02	3.81469727E-02	8.44777249E-03	0.	8.38198702E-04	3.94446448E-04	0.	1.72257423E-01
35	-1.90476190E-02	4.93827160E-02	9.07029478E-03	0.	1.30827059E-03	5.60687398E-04	0.	2.63861454E-01
36	-2.18253968E-02	6.50770512E-02	9.84189972E-03	0.	2.09385129E-03	8.14275500E-04	0.	4.30305430E-01
37	-2.49480249E-02	8.75319492E-02	1.08056241E-02	0.	3.45026442E-03	1.21225507E-03	0.	7.09060582E-01
38	-2.85087719E-02	1.20568272E-01	1.20229301E-02	0.	5.88286338E-03	1.85774633E-03	0.	1.20890170E+00
39	-3.26340326E-02	1.70753364E-01	1.35839297E-02	0.	1.04443676E-02	2.94584727E-03	0.	2.14641212E+00
40	-3.75000000E-02	2.50000000E-01	1.56250000E-02	0.	1.94638625E-02	4.86594563E-03	0.	4.00000000E+00
41	-4.33604936E-02	3.81039476E-01	1.83684172E-02	0.	3.84788162E-02	8.44836941E-03	0.	7.90774617E+00
42	-5.05952381E-02	6.10251562E-01	2.21442744E-02	0.	8.18592393E-02	1.55922361E-02	0.	1.68228159E+01
43	-5.98005645E-02	1.04123282E+00	2.75935144E-02	0.	1.91186717E-01	3.11234191E-02	0.	3.59590617E+01
44	-7.19696970E-02	1.92901235E+00	3.58700643E-02	0.	5.04ZB5529E-01	6.88549033E-02	0.	1.03737977E+02
45	-8.88888889E-02	4.00000000E+00	4.93827160E-02	0.	1.57657286E+00	1.75174763E-01	0.	3.24000000E+02
46	-1.14130435E-01	9.76562500E+00	7.33421550E-02	0.	6.26441360E+00	5.44470749E-01	0.	1.01439391E+03
47	-1.56025641E-01	2.56000000E+01	1.12657482E-01	0.	3.62616590E+01	2.36288461E+00	0.	7.37549382E+03
48	-2.39583333E-01	1.00000000E+02	2.71167361E-01	0.	4.37936907E+02	1.02473711E+01	0.	9.00000000E+04
49	-4.87755918E-01	2.50000000E+03	1.04152826E+00	0.	2.92079587E+04	2.40780790E+02	0.	8.00200000E+06

J	XX(J)	R(J)	SPRIME(J)	Y2(J)	Y1(J)	FUN3(J)	FUN2(J)	FUN0(J)
1	-2.35[illegible]111E+00	0.	0.	0.	IIIII	0.	0.	0.
2	-1.95[illegible]E+00	0.	0.	0.	IIIII	0.	0.	0.
3	-1.68[illegible]216E+00	0.	0.	0.	IIIII	0.	0.	0.
4	-1.42[illegible]345E+00	0.	0.	0.	IIIII	0.	0.	0.
5	-1.20[illegible]205E+00	0.	0.	0.	IIIII	0.	0.	0.
6	-1.03[illegible]304E+00	0.	0.	0.	IIIII	0.	0.	0.
7	-8.83[illegible]371E-01	0.	0.	0.	IIIII	0.	0.	0.
8	-7.59[illegible]E-01	0.	0.	0.	IIIII	0.	0.	0.
9	-6.559[illegible]035E-01	0.	0.	0.	IIIII	0.	0.	0.
10	-5.69[illegible]596E-01	0.	0.	0.	IIIII	0.	0.	0.
11	-4.983[illegible]E-01	0.	0.	0.	IIIII	0.	0.	0.
12	-4.38[illegible]00E-01	0.	0.	0.	IIIII	0.	0.	0.
13	-3.88[illegible]000E-01	0.	0.	0.	IIIII	0.	0.	0.
14	-3.47[illegible]000E-01	0.	0.	0.	IIIII	0.	0.	0.
15	-3.128[illegible]000E-01	0.	0.	0.	IIIII	0.	0.	0.
16	-2.840[illegible]000E-01	0.	0.	0.	IIIII	0.	0.	0.
17	-2.60000000E-01	0.	0.	0.	IIIII	0.	0.	0.
18	-2.40000000E-01	0.	0.	0.	IIIII	0.	0.	0.
19	-2.20000000E-01	0.	0.	0.	IIIII	0.	0.	0.
20	-2.00000000E-01	0.	0.	0.	IIIII	0.	0.	0.
21	-1.80000000E-01	0.	0.	0.	IIIII	0.	0.	0.
22	-1.60000000E-01	0.	0.	0.	IIIII	0.	0.	0.
23	-1.40000000E-01	0.	0.	0.	IIIII	0.	0.	0.
24	-1.20000000E-01	0.	0.	0.	IIIII	0.	0.	0.
25	-1.00000000E-01	0.	0.	0.	IIIII	0.	0.	0.
26	-8.00000000E-02	0.	0.	0.	IIIII	0.	0.	0.
27	-6.00000000E-02	0.	0.	0.	IIIII	0.	0.	0.
28	-4.00000000E-02	0.	0.	0.	IIIII	0.	0.	0.
29	-2.00000000E-02	0.	0.	0.	IIIII	0.	0.	0.
30	0.	0.	0.	0.	IIIII	0.	0.	0.
31	2.00000000E-02	3.92000000E-03	4.72897659E-03	0.	IIIII	1.53664000E-05	0.	0.
32	4.00000000E-02	7.68000000E-03	6.87889482E-03	0.	IIIII	5.69824000E-05	0.	0.
33	6.00000000E-02	1.12800000E-02	1.24738821E-02	0.	IIIII	1.27238400E-04	0.	0.
34	8.00000000E-02	1.47200000E-02	1.55380659E-02	0.	IIIII	2.16678400E-04	0.	0.
35	1.00000000E-01	1.80000000E-02	1.80955737E-02	0.	IIIII	3.24000000E-04	0.	0.
36	1.20000000E-01	2.11200000E-02	2.01705328E-02	0.	IIIII	4.40054400E-04	0.	0.
37	1.40000000E-01	2.40800000E-02	2.17870707E-02	0.	IIIII	5.79846400E-04	0.	0.
38	1.60000000E-01	2.68800000E-02	2.29693149E-02	0.	IIIII	7.22534400E-04	0.	0.
39	1.80000000E-01	2.95200000E-02	2.37413927E-02	0.	IIIII	8.71430400E-04	0.	0.
40	2.00000000E-01	3.20000000E-02	2.41274316E-02	0.	IIIII	1.02400000E-03	0.	0.
41	2.20000000E-01	3.43200000E-02	2.41515590E-02	0.	IIIII	1.17786240E-03	0.	0.
42	2.40000000E-01	3.64800000E-02	2.38379024E-02	0.	IIIII	1.33079040E-03	0.	0.
43	2.60000000E-01	3.54800000E-02	2.32105892E-02	4.04793739E-02	IIIII	1.49818265E-03	2.43796391E-03	6.93680034E-05
44	2.80000000E-01	4.03200000E-02	2.22937468E-02	4.44789702E-02	IIIII	1.69678059E-03	4.69299485E-03	2.01926759E-05
45	3.00000000E-01	4.20000000E-02	2.11115026E-02	4.84783569E-02	IIIII	1.92561285E-03	6.85048223E-03	-8.60547112E-05
46	3.20000000E-01	4.35200000E-02	1.96879842E-02	5.24775762E-02	IIIII	2.18435749E-03	8.94348618E-03	-2.15491517E-04
47	3.40000000E-01	4.48800000E-02	1.80473188E-02	5.64772168E-02	IIIII	2.47202837E-03	1.09471917E-02	-3.61130065E-04
48	3.60000000E-01	4.60800000E-02	1.62136340E-02	6.04801841E-02	IIIII	2.79100162E-03	1.30369382E-02	-5.16026406E-04
49	3.80000000E-01	4.71200000E-02	1.42110572E-02	6.44981363E-02	IIIII	3.13939877E-03	1.51225790E-02	-6.68305549E-04
50	4.00000000E-01	4.80000000E-02	1.20637158E-02	6.85729406E-02	IIIII	3.52068327E-03	1.74543088E-02	-7.38441400E-04
51	4.20000000E-01	4.87200000E-02	9.79573722E-03	7.28393837E-02	IIIII	3.94501073E-03	2.06781799E-02	-8.00471567E-04
52	4.40000000E-01	4.92800000E-02	7.43124893E-03	7.76694444E-02	IIIII	4.44484480E-03	2.65421788E-02	-5.64059265E-04
53	4.60000000E-01	4.96800000E-02	4.99437834E-03	8.38568845E-02	IIIII	5.10405961E-03	3.84274278E-02	-3.36353291E-05
54	4.80000000E-01	4.99200000E-02	2.50925288E-03	9.25030692E-02	IIIII	6.07707318E-03	5.91381300E-02	4.17850201E-04
55	5.00000000E-01	5.00000000E-02	0.	1.04211409E-01	IIIII	7.52496511E-03	8.56607125E-02	3.65535459E-04
56	5.20000000E-01	4.99200000E-02	-2.50925288E-03	1.18434180E-01	IIIII	9.49522920E-03	1.10961245E-01	8.20690575E-06
57	5.40000000E-01	4.96800000E-02	-4.99437834E-03	1.34033510E-01	IIIII	1.19190207E-02	1.31530749E-01	-2.44683051E-04
58	5.60000000E-01	4.92800000E-02	-7.43124893E-03	1.50120876E-01	IIIII	1.47044810E-02	1.47931528E-01	-3.19247860E-04
59	5.80000000E-01	4.87200000E-02	-9.79573722E-03	1.66222654E-01	IIIII	1.77841535E-02	1.61932526E-01	-3.45219242E-04
60	6.00000000E-01	4.80000000E-02	-1.20637158E-02	1.82093712E-01	IIIII	2.11084587E-02	1.72753725E-01	-4.37443023E-04
61	6.20000000E-01	4.71200000E-02	-1.42110572E-02	1.97559344E-01	IIIII	2.46285181E-02	1.81299791E-01	-6.53207693E-04
62	6.40000000E-01	4.60800000E-02	-1.62136340E-02	2.12443637E-01	IIIII	2.82848134E-02	1.86478468E-01	-1.01003344E-03
63	6.60000000E-01	4.48800000E-02	-1.80473188E-02	2.26548150E-01	IIIII	3.20022870E-02	1.87489438E-01	-1.49589841E-03
64	6.80000000E-01	4.35200000E-02	-1.96879842E-02	2.39655930E-01	IIIII	3.56908697E-02	1.83691597E-01	-2.06866753E-03
65	7.00000000E-01	4.20000000E-02	-2.11115026E-02	2.51551137E-01	IIIII	3.92513998E-02	1.74872852E-01	-2.65668526E-03
66	7.20000000E-01	4.03200000E-02	-2.22937468E-02	2.62048654E-01	IIIII	4.25865451E-02	1.61463325E-01	-3.17181733E-03
67	7.40000000E-01	3.84800000E-02	-2.32105892E-02	2.71026030E-01	IIIII	4.56145756E-02	1.44586808E-01	-3.531569[illegible]E-03
68	7.60000000E-01	3.64800000E-02	-2.38379024E-02	2.78447500E-01	IIIII	4.82819223E-02	1.25881734E-01	-3.69026616E-03
69	7.80000000E-01	3.43200000E-02	-2.41515590E-02	2.84371942E-01	IIIII	5.05700907E-02	1.07133399E-01	-3.64858296E-03
70	8.00000000E-01	3.20000000E-02	-2.41274316E-02	2.88937718E-01	IIIII	5.24944272E-02	8.98573013E-02	-3.49162703E-03
71	8.20000000E-01	2.95200000E-02	-2.37413927E-02	2.92346585E-01	3.75000000E-02	5.14872323E-02	-1.86440355E-01	-3.57387343E-03
72	8.40000000E-01	2.68800000E-02	-2.29693149E-02	2.9[illegible]8107[illegible]E-01	7.50000000E-02	4.85790060E-02	-1.00174315E-01	-2.77598903E-03
73	8.60000000E-01	2.40800000E-02	-2.17870707E-02	2.96544578E-01	1.12500000E-01	4.71063308E-02	-4.29157185E-02	-2.34465794E-03
74	8.80000000E-01	2.11200000E-02	-2.01705328E-02	2.977[illegible]E-01	1.50000000E-01	4.65622815E-02	-7.43480675E-03	-2.03471571E-03
75	9.00000000E-01	1.80000000E-02	-1.80955737E-02	2.985357[illegible]E-01	1.87500000E-01	4.65634368E-02	1.3077[illegible]06E-02	-1.79326582E-03
76	9.20000000E-01	1.47200000E-02	-1.55380659E-02	2.99[illegible]E-01	2.25000000E-01	4.69169098E-02	2.40552846E-02	-1.58914231E-03
77	9.40000000E-01	1.12800000E-02	-1.24738821E-02	2.99628170E-01	2.62500000E-01	4.74217902E-02	2.93462420E-02	-1.40355579E-03
78	9.60000000E-01	7.68000000E-03	-6.87889482E-03	2.99628880E-01	2.99628880E-01	4.80048246E-02	3.14439998E-02	-1.14971149E-03
79	9.80000000E-01	3.92000000E-03	-4.72897659E-03	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
80	1.00000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
81	1.02000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
82	1.04000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
83	1.06000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
84	1.08000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
85	1.10000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
86	1.12000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
87	1.14000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
88	1.16000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
89	1.18000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
90	1.20000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
91	1.22000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
92	1.24000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
93	1.26000000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
94	1.28400000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
95	1.31280000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
96	1.34736000E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
97	1.38883200E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
98	1.43859840E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
99	1.49821808E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
100	1.56998170E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
101	1.65597804E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
102	1.75917364E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
103	1.88300837E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
104	2.03161004E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
105	2.20953205E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
106	2.42391846E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
107	2.68670216E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
108	2.98884259E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.
109	3.35861111E+00	0.	0.	2.99628880E-01	IIIII	3.23640786E-02	0.	0.

J	X(J)	FUN(J)	FUN4(J)	FUN5(J)	FUN6(J)	FUN7(J)	FUN8(J)
1	-2.35891111E+00	0.	0.	0.	0.	0.	0.
2	-1.93d04[illegible]E+00	0.	0.	0.	0.	0.	0.
3	-1.68073[illegible]E+00	0.	0.	0.	0.	0.	0.
4	-1.42391[illegible]E+00	0.	0.	0.	0.	0.	0.
5	-1.20593[illegible]E+00	0.	0.	0.	0.	0.	0.
6	-1.03161[illegible]E+00	0.	0.	0.	0.	0.	0.
7	-8.83008371E-01	0.	0.	0.	0.	0.	0.
8	-7.59173642E-01	0.	0.	0.	0.	0.	0.
9	-6.55978036E-01	0.	0.	0.	0.	0.	0.
10	-5.69991696E-01	0.	0.	0.	0.	0.	0.
11	-4.98318603E-01	0.	0.	0.	0.	0.	0.
12	-4.38596[illegible]E-01	0.	0.	0.	0.	0.	0.
13	-3.88832000E-01	0.	0.	0.	0.	0.	0.
14	-3.47260000E-01	0.	0.	0.	0.	0.	0.
15	-3.12800000E-01	0.	0.	0.	0.	0.	0.
16	-2.84000000E-01	0.	0.	0.	0.	0.	0.
17	-2.60000000E-01	0.	0.	0.	0.	0.	0.
18	-2.40000000E-01	0.	0.	0.	0.	0.	0.
19	-2.20000000E-01	0.	0.	0.	0.	0.	0.
20	-2.00000000E-01	0.	0.	0.	0.	0.	0.
21	-1.80000000E-01	0.	0.	0.	0.	0.	0.
22	-1.60000000E-01	0.	0.	0.	0.	0.	0.
23	-1.40000000E-01	0.	0.	0.	0.	0.	0.
24	-1.20000000E-01	0.	0.	0.	0.	0.	0.
25	-1.00000000E-01	0.	0.	0.	0.	0.	0.
26	-8.00000000E-02	0.	0.	0.	0.	0.	0.
27	-6.00000000E-02	0.	0.	0.	0.	0.	0.
28	-4.00000000E-02	0.	0.	0.	0.	0.	0.
29	-2.00000000E-02	0.	0.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.
31	2.00000000E-02	0.	0.	0.	0.	0.	0.
32	4.00000000E-02	0.	0.	0.	0.	0.	0.
33	6.00000000E-02	0.	0.	0.	0.	0.	0.
34	8.00000000E-02	0.	0.	0.	0.	0.	0.
35	1.00000000E-01	0.	0.	0.	0.	0.	0.
36	1.20000000E-01	0.	0.	0.	0.	0.	0.
37	1.40000000E-01	0.	0.	0.	0.	0.	0.
38	1.60000000E-01	0.	0.	0.	0.	0.	0.
39	1.80000000E-01	0.	0.	0.	0.	0.	0.
40	2.00000000E-01	0.	0.	0.	0.	0.	0.
41	2.20000000E-01	0.	0.	0.	0.	0.	0.
42	2.40000000E-01	0.	0.	0.	0.	0.	0.
43	2.60000000E-01	9.53939531E-07	2.73510622E-02	0.	-2.65963827E-05	-8.93120375E-05	3.45869912E-03	-5.69303942E-06
44	2.80000000E-01	1.87405934E-06	2.79125273E-02	0.	-3.74626449E-05	-2.01380551E-05	4.38559760E-03	-1.09496610E-05
45	3.00000000E-01	2.74994[illegible]E-06	2.87735118E-02	0.	-3.51835941E-05	8.61082667E-05	5.89211682E-03	-1.59796184E-05
46	3.20000000E-01	3.63504[illegible]E-06	2.96052491E-02	0.	4.69942439E-05	2.15546617E-04	6.87705648E-03	-2.38505879E-05
47	3.40000000E-01	4.56172[illegible]E-06	2.99957176E-02	0.	4.77121022E-04	3.11906066E-04	7.51403175E-03	-2.56155482E-05
48	3.60000000E-01	5.62576[illegible]E-06	2.96588047E-02	0.	2.24621740E-03	3.12107888E-04	7.68198784E-03	-3.03123415E-05
49	3.80000000E-01	7.24[illegible]E-06	2.89314536E-02	0.	8.73167026E-03	6.66470119E-04	6.82019337E-03	-3.49827339E-05
50	4.00000000E-01	1.10[illegible]E-05	2.69641811E-02	0.	3.01681170E-02	7.88915622E-04	3.33831344E-03	-3.97067611E-05
51	4.20000000E-01	2.28340[illegible]E-05	2.84048774E-02	0.	5.16101592E-02	8.02002657E-04	-5.50722996E-03	-4.46011397E-05
52	4.40000000E-01	5.13814618E-05	3.23185020E-02	0.	2.40582801E-01	5.08626424E-04	-1.89542241E-02	-4.92317995E-05
53	4.60000000E-01	1.73[illegible]E-04	4.06657531E-02	0.	4.35854859E-01	4.38336920E-05	-2.43209892E-02	-5.02288896E-05
54	4.80000000E-01	3.96713413E-04	5.30762184E-02	0.	5.54302033E-01	-4.04213142E-04	-1.00126913E-02	-4.47024508E-05
55	5.00000000E-01	8.21[illegible]E-04	6.43382073E-02	0.	4.47401903E-01	-3.56673938E-04	9.91988959E-03	-5.31059251E-05
56	5.20000000E-01	1.88[illegible]E-03	6.99072368E-02	0.	2.34546598E-01	-7.41755896E-04	1.49639417E-02	-9.79424966E-05
57	5.40000000E-01	4.47269774E-03	7.05154610E-02	0.	7.85058701E-02	2.41883709E-04	8.08960031E-03	-1.58066570E-04
58	5.60000000E-01	9.96[illegible]E-03	6.87952393E-02	0.	-6.34357282E-04	3.16166453E-04	2.48825814E-03	-2.10902124E-04
59	5.80000000E-01	1.46048[illegible]E-02	6.63838314E-02	0.	-4.10768438E-02	3.41414034E-04	2.88006401E-03	-2.56493645E-04
60	6.00000000E-01	4.70930224E-02	6.38323296E-02	0.	-7.05955274E-02	4.31369014E-04	7.55971499E-03	-3.02574288E-04
61	6.20000000E-01	3.46430334E-02	6.11767190E-02	0.	1.01008737E-01	6.43602634E-04	1.41471018E-02	-3.54524193E-04
62	6.40000000E-01	1.81[illegible]E-02	5.82855419E-02	0.	-1.35638524E-01	9.97253087E-04	2.09295252E-02	-4.13279366E-04
63	6.60000000E-01	-7.39360[illegible]E-05	5.50023248E-02	0.	-1.73817149E-01	1.48098364E-03	2.64210169E-02	-4.74646589E-04
64	6.80000000E-01	-3.28740962E-04	5.13059986E-02	0.	-2.11903102E-01	2.05409376E-03	2.91174421E-02	-5.29103739E-04
65	7.00000000E-01	-5.53142537E-04	4.68492733E-02	0.	-2.44670849E-01	2.64568133E-03	2.78059448E-02	-5.63740303E-04
66	7.20000000E-01	-6.97142457E-04	4.13878058E-02	0.	-2.66394984E-01	3.16633145E-03	2.21769847E-02	-5.67123110E-04
67	7.40000000E-01	-7.33522784E-04	3.67907244E-02	0.	-2.72728922E-01	3.53276071E-03	1.32398542E-02	-5.35157914E-04
68	7.60000000E-01	-6.71112719E-04	3.15188829E-02	0.	-2.62326992E-01	3.69592572E-03	3.09888670E-03	-4.74046274E-04
69	7.80000000E-01	-5.47428137E-04	2.64689994E-02	0.	-2.37383511E-01	3.65671618E-03	-5.91885929E-03	-3.97510752E-04
70	8.00000000E-01	-4.06966917E-04	2.19016655E-02	0.	-2.02769432E-01	3.45917135E-03	-1.87359842E-03	-3.20387804E-04
71	8.20000000E-01	-2.99360304E-04	8.17997473E-03	0.	0.	3.58178024E-03	-1.69147003E-02	3.78766180E-04
72	8.40000000E-01	-1.46981405E-04	7.43337160E-03	0.	0.	2.78266334E-03	-3.08500877E-02	2.06977020E-04
73	8.60000000E-01	-7.98991395E-05	6.97398173E-03	0.	0.	2.34777674E-03	-1.86574583E-02	8.44386281E-05
74	8.80000000E-01	-4.44308361E-05	6.94253298E-03	0.	0.	2.03636341E-03	-1.38412034E-02	6.98117720E-06
75	9.00000000E-01	-2.57206279E-05	6.69227155E-03	0.	0.	1.79412860E-03	-1.11695897E-02	-3.82523572E-05
76	9.20000000E-01	-1.60615483E-05	5.95730913E-03	0.	0.	1.58957982E-03	-9.75481376E-03	-6.25414810E-05
77	9.40000000E-01	-1.13347699E-05	4.99013677E-03	0.	0.	1.40393605E-03	-1.09853831E-02	-7.92325949E-05
78	9.60000000E-01	-3.88703409E-06	4.27761771E-03	0.	0.	1.15016449E-03	-1.26885777E-02	-7.74744697E-05
79	9.80000000E-01	0.	0.	0.	0.	0.	0.	0.
80	1.00000000E+00	0.	0.	0.	0.	0.	0.	0.
81	1.02000000E+00	0.	0.	0.	0.	0.	0.	0.
82	1.04000000E+00	0.	0.	0.	0.	0.	0.	0.
83	1.06000000E+00	0.	0.	0.	0.	0.	0.	0.
84	1.08000000E+00	0.	0.	0.	0.	0.	0.	0.
85	1.10000000E+00	0.	0.	0.	0.	0.	0.	0.
86	1.12000000E+00	0.	0.	0.	0.	0.	0.	0.
87	1.14000000E+00	0.	0.	0.	0.	0.	0.	0.
88	1.16000000E+00	0.	0.	0.	0.	0.	0.	0.
89	1.18000000E+00	0.	0.	0.	0.	0.	0.	0.
90	1.20000000E+00	0.	0.	0.	0.	0.	0.	0.
91	1.22000000E+00	0.	0.	0.	0.	0.	0.	0.
92	1.24000000E+00	0.	0.	0.	0.	0.	0.	0.
93	1.26000000E+00	0.	0.	0.	0.	0.	0.	0.
94	1.28400000E+00	0.	0.	0.	0.	0.	0.	0.
95	1.31280000E+00	0.	0.	0.	0.	0.	0.	0.
96	1.34736000E+00	0.	0.	0.	0.	0.	0.	0.
97	1.38883200E+00	0.	0.	0.	0.	0.	0.	0.
98	1.43859840E+00	0.	0.	0.	0.	0.	0.	0.
99	1.49831808E+00	0.	0.	0.	0.	0.	0.	0.
100	1.56998170E+00	0.	0.	0.	0.	0.	0.	0.
101	1.65597804E+00	0.	0.	0.	0.	0.	0.	0.
102	1.75917364E+00	0.	0.	0.	0.	0.	0.	0.
103	1.88300837E+00	0.	0.	0.	0.	0.	0.	0.
104	2.03161004E+00	0.	0.	0.	0.	0.	0.	0.
105	2.20995205E+00	0.	0.	0.	0.	0.	0.	0.
106	2.42391846E+00	0.	0.	0.	0.	0.	0.	0.
107	2.68073215E+00	0.	0.	0.	0.	0.	0.	0.
108	2.98884259E+00	0.	0.	0.	0.	0.	0.	0.
109	3.35861111E+00	0.	0.	0.	0.	0.	0.	0.

J	X(J)	FUN(J)	FUNA(J)	FUNB(J)	IFUN(J)	IGO(J)	KOPA(J)	KLUC(J)	IFUN(J)
1	-2.35861111E+00	0.	1.00000000E+00	0.	0	4	50	R	
2	-1.98882937E+00	0.	1.00000000E+00	0.	0	4	50	R	
3	-1.68973216E+00	0.	1.00000000E+00	0.	0	4	50	R	
4	-1.42391846E+00	0.	1.00000000E+00	0.	0	4	50	R	
5	-1.20993205E+00	0.	1.00000000E+00	0.	0	4	50	R	
6	-1.03161094E+00	0.	1.00000000E+00	0.	0	4	50	R	
7	-8.84003371E-01	0.	1.00000000E+00	0.	0	4	50	R	
8	-7.59173542E-01	0.	1.00000000E+00	0.	0	4	50	R	
9	-6.55978035E-01	0.	1.00000000E+00	0.	0	4	50	R	
10	-5.69981696E-01	0.	1.00000000E+00	0.	0	4	50	R	
11	-4.98318080E-01	0.	1.00000000E+00	0.	0	4	50	R	
12	-4.38598400E-01	0.	1.00000000E+00	0.	0	4	50	R	
13	-3.88822003E-01	0.	1.00000000E+00	0.	0	4	50	R	
14	-3.47360000E-01	0.	1.00000000E+00	0.	0	4	50	R	
15	-3.12800000E-01	0.	1.00000000E+00	0.	0	4	50	R	
16	-2.84000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
17	-2.60000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
18	-2.40000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
19	-2.20000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
20	-2.00000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
21	-1.80000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
22	-1.60000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
23	-1.40000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
24	-1.20000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
25	-1.00000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
26	-8.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
27	-6.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
28	-4.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
29	-2.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
30	0.	0.	1.00000000E+00	0.	0	4	50	R	
31	2.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
32	4.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
33	6.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
34	8.00000000E-02	0.	1.00000000E+00	0.	0	4	50	R	
35	1.00000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
36	1.20000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
37	1.40000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
38	1.60000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
39	1.80000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
40	2.00000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
41	2.20000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
42	2.40000000E-01	0.	1.00000000E+00	0.	0	4	50	R	
43	2.60000000E-01	2.38484883E-07	1.00000000E+00	0.	1	5	50	R	1
44	2.80000000E-01	4.68514834E-07	1.00000000E+00	0.	2	6	50	R	1
45	3.00000000E-01	6.87467126E-07	1.00000000E+00	0.	2	6	50	R	1
46	3.20000000E-01	9.08760400E-07	1.00000000E+00	0.	2	6	50	R	1
47	3.40000000E-01	1.14943019E-06	1.00000000E+00	0.	2	6	50	R	1
48	3.60000000E-01	1.40842633E-06	1.00000000E+00	0.	3	7	50	R	1
49	3.80000000E-01	1.81024096E-06	1.00000000E+00	0.	3	7	50	R	1
50	4.00000000E-01	2.71492227E-06	1.00000000E+00	0.	3	7	50	R	1
51	4.20000000E-01	5.78651650E-06	1.00000000E+00	0.	3	7	50	R	1
52	4.40000000E-01	1.53453694E-05	1.00000000E+00	0.	3	7	50	R	1
53	4.60000000E-01	4.32622169E-05	1.00000000E+00	0.	4	8	50	R	1
54	4.80000000E-01	9.91796032E-05	1.00000000E+00	0.	4	8	50	R	1
55	5.00000000E-01	1.55353777E-04	1.00000000E+00	0.	5	9	50	R	1
56	5.20000000E-01	1.72024345E-04	1.00000000E+00	0.	5	9	50	R	1
57	5.40000000E-01	1.61842493E-04	1.00000000E+00	0.	6	10	50	R	1
58	5.60000000E-01	1.49012742E-04	1.00000000E+00	0.	7	11	50	R	1
59	5.80000000E-01	1.36512215E-04	1.00000000E+00	0.	7	11	50	R	1
60	6.00000000E-01	1.17732556E-04	1.00000000E+00	0.	8	12	50	R	1
61	6.20000000E-01	8.65750359E-05	1.00000000E+00	0.	8	12	50	R	1
62	6.40000000E-01	4.04195618E-05	1.00000000E+00	0.	9	13	50	R	1
63	6.60000000E-01	-1.84840078E-05	1.00000000E+00	0.	9	13	50	R	1
64	6.80000000E-01	-8.21852405E-05	1.00000000E+00	0.	10	14	50	R	1
65	7.00000000E-01	-1.38285657E-04	1.00000000E+00	0.	10	14	50	R	1
66	7.20000000E-01	-1.74285614E-04	1.00000000E+00	0.	10	14	50	R	1
67	7.40000000E-01	-1.83286969E-04	1.00000000E+00	0.	10	14	50	R	1
68	7.60000000E-01	-1.67778183E-04	1.00000000E+00	0.	11	15	50	R	1
69	7.80000000E-01	-1.36357034E-04	1.00000000E+00	0.	11	15	50	R	1
70	8.00000000E-01	-1.01742204E-04	1.00000000E+00	0.	11	15	50	R	2
71	8.20000000E-01	-7.48400313E-05	1.00000000E+00	0.	11	15	50	R	4
72	8.40000000E-01	-5.67459664E-05	1.00000000E+00	0.	11	15	50	R	6
73	8.60000000E-01	-4.99747774E-05	1.00000000E+00	0.	11	15	50	R	7
74	8.80000000E-01	-1.11077315E-05	1.00000000E+00	0.	11	15	50	R	8
75	9.00000000E-01	-6.43015698E-06	1.00000000E+00	0.	11	15	50	R	10
76	9.20000000E-01	-4.01936707E-06	1.00000000E+00	0.	11	15	50	R	10
77	9.40000000E-01	-2.83369249E-06	1.00000000E+00	0.	11	15	50	R	11
78	9.60000000E-01	-9.71758323E-07	1.00000000E+00	0.	11	15	50	R	12
79	9.80000000E-01	0.	1.00000000E+00	0.	11	15	50	R	
80	1.00000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
81	1.02000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
82	1.04000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
83	1.06000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
84	1.08000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
85	1.10000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
86	1.12000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
87	1.14000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
88	1.16000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
89	1.18000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
90	1.20000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
91	1.22000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
92	1.24000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
93	1.26000000E+00	0.	1.00000000E+00	0.	11	15	50	R	
94	1.28400000E+00	0.	1.00000000E+00	0.	11	15	50	R	
95	1.31280000E+00	0.	1.00000000E+00	0.	11	15	50	R	
96	1.34736000E+00	0.	1.00000000E+00	0.	11	15	50	R	
97	1.38883200E+00	0.	1.00000000E+00	0.	11	15	50	R	
98	1.43859840E+00	0.	1.00000000E+00	0.	11	15	50	R	
99	1.49831808E+00	0.	1.00000000E+00	0.	11	15	50	R	
100	1.56998170E+00	0.	1.00000000E+00	0.	11	15	50	R	
101	1.65597804E+00	0.	1.00000000E+00	0.	11	15	50	R	
102	1.75917364E+00	0.	1.00000000E+00	0.	11	15	50	R	
103	1.88300827E+00	0.	1.00000000E+00	0.	11	15	50	R	
104	2.03161004E+00	0.	1.00000000E+00	0.	11	15	50	R	
105	2.20993205E+00	0.	1.00000000E+00	0.	11	15	50	R	
106	2.42391846E+00	0.	1.00000000E+00	0.	11	15	50	R	
107	2.68070216E+00	0.	1.00000000E+00	0.	11	15	50	R	
108	2.98984259E+00	0.	1.00000000E+00	0.	11	15	50	R	
109	3.35861111E+00	0.	1.00000000E+00	0.					

J	XH(J)	FUN9(J)	FUN9(J)	FUN10(J)	FUN11(J)	FUN12(J)	Y2PRM(J)
1	-2.35[illegible]E+00	0.	0.	0.	*****	*****	0.
2	-2.[illegible]E+00	0.	0.	0.	*****	*****	0.
3	-1.68070216E+00	0.	0.	0.	*****	*****	0.
4	-1.42391846E+00	0.	0.	0.	*****	*****	0.
5	-1.20993205E+00	0.	0.	0.	*****	*****	0.
6	-1.03161004E+00	0.	0.	0.	*****	*****	0.
7	-8.83083371E-01	0.	0.	0.	*****	*****	0.
8	-7.59173642E-01	0.	0.	0.	*****	*****	0.
9	-6.55978035E-01	0.	0.	0.	*****	*****	0.
10	-5.69981696E-01	0.	0.	0.	*****	*****	0.
11	-4.98318036E-01	0.	0.	0.	*****	*****	0.
12	-4.38598403E-01	0.	0.	0.	*****	*****	0.
13	-3.88823000E-01	0.	0.	0.	*****	*****	0.
14	-3.47360000E-01	0.	0.	0.	*****	*****	0.
15	-3.12830000E-01	0.	0.	0.	*****	*****	0.
16	-2.84000000E-01	0.	0.	0.	*****	*****	0.
17	-2.60000000E-01	0.	0.	0.	*****	*****	0.
18	-2.40000000E-01	0.	0.	0.	*****	*****	0.
19	-2.20000000E-01	0.	0.	0.	*****	*****	0.
20	-2.00000000E-01	0.	0.	0.	*****	*****	0.
21	-1.80000000E-01	0.	0.	0.	*****	*****	0.
22	-1.60000000E-01	0.	0.	0.	*****	*****	0.
23	-1.40000000E-01	0.	0.	0.	*****	*****	0.
24	-1.20000000E-01	0.	0.	0.	*****	*****	0.
25	-1.00000000E-01	0.	0.	0.	*****	*****	0.
26	-8.00000000E-02	0.	0.	0.	*****	*****	0.
27	-6.00000000E-02	0.	0.	0.	*****	*****	0.
28	-4.00000000E-02	0.	0.	0.	*****	*****	0.
29	-2.00000000E-02	0.	0.	0.	*****	*****	0.
30	0.	0.	0.	0.	*****	*****	0.
31	2.00000000E-02	0.	0.	0.	*****	*****	0.
32	4.00000000E-02	0.	0.	0.	*****	*****	0.
33	6.00000000E-02	0.	0.	0.	*****	*****	0.
34	8.00000000E-02	0.	0.	0.	*****	*****	0.
35	1.00000000E-01	0.	0.	0.	*****	*****	0.
36	1.20000000E-01	0.	0.	0.	*****	*****	0.
37	1.40000000E-01	0.	0.	0.	*****	*****	0.
38	1.60000000E-01	0.	0.	0.	*****	*****	0.
39	1.80000000E-01	0.	0.	0.	*****	*****	0.
40	2.00000000E-01	0.	0.	0.	*****	*****	0.
41	2.20000000E-01	0.	0.	0.	*****	*****	0.
42	2.40000000E-01	0.	0.	0.	*****	*****	0.
43	2.60000000E-01	7.01575124E-06	-1.74411161E+03	2.24728517E+01	*****	*****	1.99984164E-01
44	2.80000000E-01	1.52952951E-05	-2.30310284E+03	3.26075509E+01	*****	*****	1.99974936E-01
45	3.00000000E-01	2.53379962E-05	-2.38238377E+03	3.67628982E+01	*****	*****	1.99963804E-01
46	3.20000000E-01	3.75243090E-05	-2.26513409E+03	3.78370972E+01	*****	*****	1.99961870E-01
47	3.40000000E-01	5.22345571E-05	-2.07620773E+03	3.73245182E+01	*****	*****	2.00022074E-01
48	3.60000000E-01	6.98907187E-05	-1.87157399E+03	3.60304953E+01	*****	*****	2.00356851E-01
49	3.80000000E-01	9.11915283E-05	-1.67849228E+03	3.44601C85E+01	*****	*****	2.01740909E-01
50	4.00000000E-01	1.18035259E-04	-1.51626010E+03	3.29960839E+01	*****	*****	2.06744396E-01
51	4.20000000E-01	1.50690493E-04	-1.41130777E+03	3.27149150E+01	*****	*****	2.22801513E-01
52	4.40000000E-01	2.26608048E-04	-1.40096366E+03	3.46357790E+01	*****	*****	2.66801242E-01
53	4.60000000E-01	3.76688783E-04	-1.49249215E+03	3.98383101E+01	*****	*****	3.61926527E-01
54	4.80000000E-01	6.90310037E-04	-1.65140452E+03	4.56805615E+01	*****	*****	5.08498846E-01
55	5.00000000E-01	1.23842499E-03	-1.39541742E+03	4.62881193E+01	*****	*****	6.57099057E-01
56	5.20000000E-01	2.02379960E-03	-1.08329126E+03	4.08387485E+01	*****	*****	7.54859602E-01
57	5.40000000E-01	3.01058538E-03	-7.96630585E+02	3.33903009E+01	*****	*****	7.97613970E-01
58	5.60000000E-01	4.17823238E-03	-5.59472221E+02	2.67345752E+01	*****	*****	8.07376720E-01
59	5.80000000E-01	5.51791910E-03	-4.06425811E+02	2.15041173E+01	*****	*****	8.00890341E-01
60	6.00000000E-01	7.00432182E-03	-3.01807323E+02	1.74934251E+01	*****	*****	7.84813515E-01
61	6.20000000E-01	8.57665086E-03	-2.28606806E+02	1.43759599E+01	*****	*****	7.60298731E-01
62	6.40000000E-01	1.01312762E-02	-1.75347391E+02	1.18913123E+01	*****	*****	7.26472650E-01
63	6.60000000E-01	1.17249744E-02	-1.36715224E+02	9.85887872E+00	*****	*****	6.82153787E-01
64	6.80000000E-01	1.25929816E-02	-1.05959341E+02	8.15937744E+00	*****	*****	6.26799983E-01
65	7.00000000E-01	1.31843794E-02	-8.38879155E+01	6.71700721E+00	*****	*****	5.61150168E-01
66	7.20000000E-01	1.32077361E-02	-6.57700700E+01	5.48605762E+00	*****	*****	4.87559875E-01
67	7.40000000E-01	1.26681867E-02	-5.14714974E+01	4.44045970E+00	*****	*****	4.09873887E-01
68	7.60000000E-01	1.16742815E-02	-4.02226746E+01	3.56504119E+00	*****	*****	3.32782036E-01
69	7.80000000E-01	1.04064059E-02	-3.14673418E+01	2.84837344E+00	*****	*****	2.60848076E-01
70	8.00000000E-01	9.06144852E-03	-2.47659446E+01	2.27778255E+00	*****	*****	1.97587913E-01
71	8.20000000E-01	-1.84383314E-02	4.90263960E+01	-4.56223993E+00	*****	*****	1.44942203E-01
72	8.40000000E-01	-9.34732087E-03	2.54721193E+01	-2.39033389E+00	*****	*****	1.03262401E-01
73	8.60000000E-01	-3.88509316E-03	1.06599430E+01	-1.00618699E+00	*****	*****	7.16843111E-02
74	8.80000000E-01	-6.54950322E-04	1.81733182E+00	-1.72232255E-01	*****	*****	4.86510726E-02
75	9.00000000E-01	1.17024524E-03	-3.16292002E+00	3.30562374E-01	*****	*****	3.23838306E-02
76	9.20000000E-01	2.16781415E-03	-5.77609065E+00	5.49855773E-01	*****	*****	2.12022319E-02
77	9.40000000E-01	2.67302751E-03	-7.01423082E+00	6.58488326E-01	*****	*****	1.36831542E-02
78	9.60000000E-01	2.89937787E-03	-7.49350930E+00	7.14692210E-01	*****	*****	8.73272256E-03
79	9.80000000E-01	0.	-0.	0.	*****	*****	0.
80	1.00000000E+00	0.	-0.	0.	*****	*****	0.
81	1.02000000E+00	0.	-0.	0.	*****	*****	0.
82	1.04000000E+00	0.	-0.	0.	*****	*****	0.
83	1.06000000E+00	0.	-0.	0.	*****	*****	0.
84	1.08000000E+00	0.	-0.	0.	*****	*****	0.
85	1.10000000E+00	0.	-0.	0.	*****	*****	0.
86	1.12000000E+00	0.	-0.	0.	*****	*****	0.
87	1.14000000E+00	0.	-0.	0.	*****	*****	0.
88	1.16000000E+00	0.	-0.	0.	*****	*****	0.
89	1.18000000E+00	0.	-0.	0.	*****	*****	0.
90	1.20000000E+00	0.	-0.	0.	*****	*****	0.
91	1.22000000E+00	0.	-0.	0.	*****	*****	0.
92	1.24000000E+00	0.	-0.	0.	*****	*****	0.
93	1.26000000E+00	0.	-0.	0.	*****	*****	0.
94	1.28000000E+00	0.	-0.	0.	*****	*****	0.
95	1.30000000E+00	0.	-0.	0.	*****	*****	0.
96	1.32000000E+00	0.	-0.	0.	*****	*****	0.
97	1.34000000E+00	0.	-0.	0.	*****	*****	0.
98	1.36000000E+00	0.	-0.	0.	*****	*****	0.
99	1.38000000E+00	0.	-0.	0.	*****	*****	0.
100	1.40000000E+00	0.	-0.	0.	*****	*****	0.
101	1.42000000E+00	0.	-0.	0.	*****	*****	0.
102	1.44000000E+00	0.	-0.	0.	*****	*****	0.
103	1.46000000E+00	0.	-0.	0.	*****	*****	0.
104	1.48000000E+00	0.	-0.	0.	*****	*****	0.
105	1.50000000E+00	0.	-0.	0.	*****	*****	0.
106	1.52000000E+00	0.	-0.	0.	*****	*****	0.
107	1.54000000E+00	0.	-0.	0.	*****	*****	0.
108	1.56000000E+00	0.	-0.	0.	*****	*****	0.
109	1.58000000E+00	0.	-0.	0.	*****	*****	0.

J	XX(J)	VLAM(JG)	VTAN(JG)	VLAMP(JG)	VTANP(JG)	GAN	GANDX	YY(JG)	Z(JG)	R(J)	Y2(J)
43	2.400E-01	1.871E-02	2.822E-02	8.826E-01	1.749E+00	3.422E+03	1.764E+01	4.017E-02	6.[illegible]4E-04	3.848E-02	4.048E-02
44	2.800E-01	3.472E-02	6.952E-02	7.186E-01	1.468E+00	7.048E+03	1.856E-01	4.378E-02	1.[illegible]E-03	4.032E-02	4.448E-02
45	3.000E-01	4.333E-02	9.977E-02	6.252E-01	1.446E+00	1.079E-02	1.908E-01	4.735E-02	1.[illegible]E-03	4.200E-02	4.848E-02
46	3.200E-01	5.020E-02	1.270E-01	5.503E-01	1.336E+00	1.404E-02	1.957E-01	5.087E-02	2.[illegible]E-03	4.352E-02	5.248E-02
47	3.400E-01	7.066E-02	1.933E-01	4.884E-01	1.241E+00	1.899E-02	2.001E-01	5.436E-02	3.[illegible]E-03	4.488E-02	5.648E-02
48	3.600E-01	7.995E-02	1.773E-01	4.350E-01	1.160E+00	2.292E-02	2.045E-01	5.783E-02	3.[illegible]E-03	4.608E-02	6.048E-02
49	3.800E-01	8.816E-02	1.993E-01	3.837E-01	1.091E+00	2.677E-02	2.105E-01	6.128E-02	4.30[illegible]-03	4.712E-02	6.450E-02
50	4.000E-01	9.517E-02	2.214E-01	3.191E-01	1.039E+00	3.112E-02	2.242E-01	6.470E-02	4.836E-03	4.800E-02	6.857E-02
51	4.200E-01	1.003E-01	2.417E-01	2.042E-01	1.017E+00	3.601E-02	2.633E-01	6.826E-02	5.289E-03	4.872E-02	7.284E-02
52	4.400E-01	1.017E-01	2.624E-01	-1.817E-02	1.039E+00	4.242E-02	3.717E-01	7.239E-02	5.552E-03	4.928E-02	7.767E-02
53	4.600E-01	9.735E-02	2.837E-01	-3.196E-01	1.074E+00	5.226E-02	6.075E-01	7.759E-02	5.482E-03	4.968E-02	8.386E-02
54	4.800E-01	8.861E-02	3.046E-01	-4.527E-01	5.860E-01	6.783E-02	9.069E-01	8.515E-02	5.124E-03	4.992E-02	9.250E-02
55	5.000E-01	8.103E-02	3.216E-01	-3.183E-01	7.019E-01	8.698E-02	1.001E+00	9.588E-02	4.821E-03	5.000E-02	1.042E-01
56	5.200E-01	7.730E-02	3.320E-01	-1.400E-01	3.624E-01	1.043E-01	8.488E-01	1.093E-01	4.775E-03	4.992E-02	1.184E-01
57	5.400E-01	7.625E-02	3.385E-01	-3.203E-02	1.113E-01	1.190E-01	6.482E-01	1.243E-01	4.925E-03	4.968E-02	1.340E-01
58	5.600E-01	7.642E-02	3.372E-01	1.532E-02	-3.043E-02	1.300E-01	5.052E-01	1.398E-01	5.177E-03	4.928E-02	1.501E-01
59	5.800E-01	7.707E-02	3.358E-01	3.403E-02	-9.833E-02	1.390E-01	4.167E-01	1.554E-01	5.478E-03	4.872E-02	1.662E-01
60	6.000E-01	7.795E-02	3.335E-01	4.597E-02	-1.228E-01	1.469E-01	3.539E-01	1.708E-01	5.808E-03	4.800E-02	1.821E-01
61	6.200E-01	7.909E-02	3.310E-01	6.136E-02	-1.223E-01	1.529E-01	2.957E-01	1.859E-01	6.167E-03	4.712E-02	1.976E-01
62	6.400E-01	8.063E-02	3.287E-01	8.430E-02	-1.067E-01	1.580E-01	2.313E-01	2.003E-01	6.564E-03	4.608E-02	2.124E-01
63	6.600E-01	8.272E-02	3.268E-01	1.167E-01	-8.172E-02	1.618E-01	1.562E-01	2.141E-01	7.014E-03	4.488E-02	2.265E-01
64	6.800E-01	8.556E-02	3.255E-01	1.594E-01	-5.083E-02	1.639E-01	7.019E-02	2.268E-01	7.536E-03	4.352E-02	2.397E-01
65	7.000E-01	8.935E-02	3.248E-01	2.128E-01	-1.692E-02	1.642E-01	-2.249E-02	2.384E-01	8.148E-03	4.200E-02	2.516E-01
66	7.200E-01	9.429E-02	3.248E-01	2.760E-01	1.728E-02	1.627E-01	-1.140E-01	2.486E-01	8.872E-03	4.032E-02	2.620E-01
67	7.400E-01	1.005E-01	3.255E-01	3.466E-01	4.909E-02	1.596E-01	-1.944E-01	2.573E-01	9.722E-03	3.848E-02	2.710E-01
68	7.600E-01	1.082E-01	3.268E-01	4.207E-01	7.622E-02	1.551E-01	-2.546E-01	2.646E-01	1.072E-02	3.648E-02	2.784E-01
69	7.800E-01	1.173E-01	3.285E-01	4.925E-01	9.713E-02	1.497E-01	-2.888E-01	2.705E-01	1.186E-02	3.432E-02	2.844E-01
70	8.000E-01	1.277E-01	3.306E-01	5.559E-01	1.115E-01	1.439E-01	-2.957E-01	2.751E-01	1.312E-02	3.200E-02	2.889E-01
71	8.200E-01	1.392E-01	3.330E-01	6.055E-01	1.200E-01	1.382E-01	-2.825E-01	2.787E-01	1.450E-02	2.952E-02	2.923E-01
72	8.400E-01	1.515E-01	3.354E-01	6.378E-01	1.242E-01	1.329E-01	-2.533E-01	2.815E-01	1.595E-02	2.688E-02	2.948E-01
73	8.600E-01	1.643E-01	3.379E-01	6.521E-01	1.260E-01	1.282E-01	-2.163E-01	2.837E-01	1.745E-02	2.408E-02	2.965E-01
74	8.800E-01	1.773E-01	3.403E-01	6.503E-01	1.266E-01	1.243E-01	-1.776E-01	2.854E-01	1.894E-02	2.112E-02	2.977E-01
75	9.000E-01	1.901E-01	3.427E-01	6.360E-01	1.267E-01	1.212E-01	-1.411E-01	2.867E-01	2.042E-02	1.800E-02	2.985E-01
76	9.200E-01	2.026E-01	3.450E-01	6.134E-01	1.266E-01	1.187E-01	-1.091E-01	2.879E-01	2.185E-02	1.472E-02	2.991E-01
77	9.400E-01	2.145E-01	3.481E-01	5.865E-01	1.263E-01	1.168E-01	-8.211E-02	2.888E-01	2.324E-02	1.128E-02	2.994E-01
78	9.600E-01	2.250E-01	3.505E-01	5.585E-01	1.245E-01	1.154E-01	-6.021E-02	2.897E-01	2.458E-02	7.680E-03	2.996E-01

SIGMA = 4.86596563E-03

DELTA = 5.00000000E-02

BETASQ = 3.96000000E-02

DXR = 5.00000000E+01

DXSQR = 2.50000000E+03

GAMP1 = 2.30496000E+00

GP1DXR = 1.15248000E+02

KMM1 = 49

KFM1 = 48

KF = 49

DELETA = 2.00000000E-02

PIR = 3.18309886E-01

CON4 = 2.18792935E-01

CON5 = IIIII

H = IIIII

JT = 123

JI = 2

JF = 108

DX = 2.00000000E-02

JXN = 7

SNO = 0.

CS2O = 1.00000000E+00

SNALP = 6.97564737E-02

IJW = 71

JW1O = 43

JW2O = 71

JW1X = R

JW3X = R

BETA = IIIII

JW3M1 = 77

DLTPH = 2.63895147E-04

JCHCK = 78

IW = 1

JW1OM2 = 41

JW3P1 = 79

JW1OM1 = 42

M = 78

XWM = IIIII

XWMSQR = IIIII

LOCATION AND VALUE OF GREATEST CHANGE IN VELOCITY POTENTIAL (NEGATIVE LOCATION INDICES ARE FOR POINTS UNDER WING)

I=	1	JMARK=	69	KMARK=	1	DPHIMX=	1.11764467E-02
I=	2	JMARK=	-71	KMARK=	-2	DPHIMX=	4.02985866E-03
I=	3	JMARK=	-70	KMARK=	-2	DPHIMX=	1.94666761E-03
I=	4	JMARK=	-71	KMARK=	-2	DPHIMX=	1.25219995E-03
I=	5	JMARK=	-66	KMARK=	-1	DPHIMX=	9.61927189E-04
I=	6	JMARK=	78	KMARK=	1	DPHIMX=	1.05586409E-04
I=	7	JMARK=	78	KMARK=	1	DPHIMX=	9.59225312E-05
I=	8	JMARK=	78	KMARK=	1	DPHIMX=	9.05485458E-05
I=	9	JMARK=	78	KMARK=	1	DPHIMX=	8.41398567E-05
I=	10	JMARK=	78	KMARK=	1	DPHIMX=	7.85150904E-05
I=	11	JMARK=	78	KMARK=	1	DPHIMX=	7.32160674E-05
I=	12	JMARK=	78	KMARK=	1	DPHIMX=	6.86013757E-05
I=	13	JMARK=	78	KMARK=	1	DPHIMX=	6.46199897E-05
I=	14	JMARK=	78	KMARK=	1	DPHIMX=	6.09401991E-05
I=	15	JMARK=	78	KMARK=	1	DPHIMX=	5.78092335E-05
I=	16	JMARK=	78	KMARK=	1	DPHIMX=	5.49343102E-05
I=	17	JMARK=	78	KMARK=	1	DPHIMX=	5.23569608E-05
I=	18	JMARK=	78	KMARK=	1	DPHIMX=	5.00228118E-05
I=	19	JMARK=	78	KMARK=	1	DPHIMX=	4.78872228E-05
I=	20	JMARK=	78	KMARK=	1	DPHIMX=	4.59242397E-05
I=	21	JMARK=	78	KMARK=	1	DPHIMX=	4.41000621E-05
I=	22	JMARK=	78	KMARK=	1	DPHIMX=	4.23921712E-05
I=	23	JMARK=	78	KMARK=	1	DPHIMX=	4.07812310E-05
I=	24	JMARK=	78	KMARK=	1	DPHIMX=	3.92548354E-05
I=	25	JMARK=	78	KMARK=	1	DPHIMX=	3.77834008E-05
I=	26	JMARK=	78	KMARK=	1	DPHIMX=	3.63859394E-05
I=	27	JMARK=	78	KMARK=	1	DPHIMX=	3.50700923E-05
I=	28	JMARK=	78	KMARK=	1	DPHIMX=	3.38324635E-05
I=	29	JMARK=	78	KMARK=	1	DPHIMX=	3.26407952E-05
I=	30	JMARK=	78	KMARK=	1	DPHIMX=	3.15109701E-05
I=	31	JMARK=	78	KMARK=	1	DPHIMX=	3.04537760E-05
I=	32	JMARK=	78	KMARK=	1	DPHIMX=	2.94574684E-05
I=	33	JMARK=	78	KMARK=	1	DPHIMX=	2.85014843E-05
I=	34	JMARK=	78	KMARK=	1	DPHIMX=	2.75948242E-05
I=	35	JMARK=	78	KMARK=	1	DPHIMX=	2.67419258E-05
I=	36	JMARK=	78	KMARK=	1	DPHIMX=	2.59215478E-05
I=	37	JMARK=	78	KMARK=	1	DPHIMX=	2.51413685E-05
I=	38	JMARK=	78	KMARK=	1	DPHIMX=	2.44077840E-05
I=	39	JMARK=	78	KMARK=	1	DPHIMX=	2.37116166E-05
I=	40	JMARK=	78	KMARK=	1	DPHIMX=	2.30501701E-05
I=	41	JMARK=	78	KMARK=	1	DPHIMX=	2.24211303E-05
I=	42	JMARK=	78	KMARK=	1	DPHIMX=	2.18211957E-05
I=	43	JMARK=	78	KMARK=	1	DPHIMX=	2.12487669E-05
I=	44	JMARK=	78	KMARK=	1	DPHIMX=	2.06780512E-05
I=	45	JMARK=	78	KMARK=	1	DPHIMX=	2.01333381E-05
I=	46	JMARK=	78	KMARK=	1	DPHIMX=	1.96261292E-05
I=	47	JMARK=	78	KMARK=	1	DPHIMX=	1.90991005E-05
I=	48	JMARK=	78	KMARK=	1	DPHIMX=	1.85717804E-05
I=	49	JMARK=	78	KMARK=	1	DPHIMX=	1.81097481E-05
I=	50	JMARK=	78	KMARK=	1	DPHIMX=	1.76173664E-05
I=	51	JMARK=	78	KMARK=	1	DPHIMX=	1.71924752E-05
I=	52	JMARK=	78	KMARK=	1	DPHIMX=	1.67386667E-05
I=	53	JMARK=	78	KMARK=	1	DPHIMX=	1.63460425E-05
I=	54	JMARK=	78	KMARK=	1	DPHIMX=	1.59046816E-05
I=	55	JMARK=	78	KMARK=	1	DPHIMX=	1.55241438E-05
I=	56	JMARK=	78	KMARK=	1	DPHIMX=	1.51856047E-05
I=	57	JMARK=	78	KMARK=	1	DPHIMX=	1.48695835E-05
I=	58	JMARK=	78	KMARK=	1	DPHIMX=	1.44715651E-05
I=	59	JMARK=	78	KMARK=	1	DPHIMX=	1.41162364E-05
I=	60	JMARK=	78	KMARK=	1	DPHIMX=	1.38059950E-05
I=	61	JMARK=	78	KMARK=	1	DPHIMX=	1.35194646E-05
I=	62	JMARK=	78	KMARK=	1	DPHIMX=	1.32034530E-05
I=	63	JMARK=	78	KMARK=	1	DPHIMX=	1.27697994E-05
I=	64	JMARK=	78	KMARK=	1	DPHIMX=	1.23761797E-05
I=	65	JMARK=	78	KMARK=	1	DPHIMX=	1.20487144E-05
I=	66	JMARK=	78	KMARK=	1	DPHIMX=	1.17637029E-05
I=	67	JMARK=	78	KMARK=	1	DPHIMX=	1.15131939E-05
I=	68	JMARK=	78	KMARK=	1	DPHIMX=	1.12889837E-05
I=	69	JMARK=	78	KMARK=	1	DPHIMX=	1.10834788E-05
I=	70	JMARK=	78	KMARK=	1	DPHIMX=	1.08983505E-05
I=	71	JMARK=	78	KMARK=	1	DPHIMX=	1.05479349E-05
I=	72	JMARK=	78	KMARK=	1	DPHIMX=	1.01812349E-05
I=	73	JMARK=	78	KMARK=	1	DPHIMX=	9.88326255E-06
I=	74	JMARK=	78	KMARK=	1	DPHIMX=	9.63552008E-06
I=	75	JMARK=	78	KMARK=	1	DPHIMX=	9.43041947E-06
I=	76	JMARK=	78	KMARK=	1	DPHIMX=	9.25811576E-06
I=	77	JMARK=	78	KMARK=	1	DPHIMX=	9.10404824E-06
I=	78	JMARK=	78	KMARK=	1	DPHIMX=	8.95251458E-06
I=	79	JMARK=	78	KMARK=	1	DPHIMX=	8.79976956E-06
I=	80	JMARK=	78	KMARK=	1	DPHIMX=	8.40924542E-06
I=	81	JMARK=	78	KMARK=	1	DPHIMX=	8.23611186E-06
I=	82	JMARK=	78	KMARK=	1	DPHIMX=	7.92768657E-06
I=	83	JMARK=	78	KMARK=	1	DPHIMX=	7.82648919E-06
I=	84	JMARK=	78	KMARK=	1	DPHIMX=	7.58696111E-06
I=	85	JMARK=	78	KMARK=	1	DPHIMX=	7.25281521E-06
I=	86	JMARK=	78	KMARK=	1	DPHIMX=	6.96404202E-06
I=	87	JMARK=	78	KMARK=	19	DPHIMX=	6.74926583E-06
I=	88	JMARK=	78	KMARK=	19	DPHIMX=	6.60152848E-06
I=	89	JMARK=	78	KMARK=	19	DPHIMX=	6.46435650E-06
I=	90	JMARK=	78	KMARK=	19	DPHIMX=	6.33746691E-06
I=	91	JMARK=	78	KMARK=	19	DPHIMX=	6.21973408E-06
I=	92	JMARK=	78	KMARK=	1	DPHIMX=	6.12662176E-06
I=	93	JMARK=	78	KMARK=	1	DPHIMX=	6.06942187E-06
I=	94	JMARK=	78	KMARK=	1	DPHIMX=	6.01956277E-06
I=	95	JMARK=	78	KMARK=	1	DPHIMX=	5.97247437E-06
I=	96	JMARK=	78	KMARK=	1	DPHIMX=	5.92899124E-06
I=	97	JMARK=	78	KMARK=	1	DPHIMX=	5.88648416E-06
I=	98	JMARK=	78	KMARK=	1	DPHIMX=	5.84361441E-06
I=	99	JMARK=	78	KMARK=	1	DPHIMX=	5.80034490E-06
I=	100	JMARK=	78	KMARK=	1	DPHIMX=	5.75527678E-06
I=	101	JMARK=	78	KMARK=	1	DPHIMX=	5.69858812E-06
I=	102	JMARK=	78	KMARK=	1	DPHIMX=	5.63721206E-06
I=	103	JMARK=	78	KMARK=	1	DPHIMX=	5.57534019E-06
I=	104	JMARK=	78	KMARK=	1	DPHIMX=	5.51475460E-06
I=	105	JMARK=	78	KMARK=	1	DPHIMX=	5.45495160E-06
I=	106	JMARK=	78	KMARK=	1	DPHIMX=	5.39756789E-06
I=	107	JMARK=	78	KMARK=	1	DPHIMX=	5.34153568E-06
I=	108	JMARK=	78	KMARK=	1	DPHIMX=	5.28605844E-06
I=	109	JMARK=	78	KMARK=	1	DPHIMX=	5.23170661E-06
I=	110	JMARK=	78	KMARK=	1	DPHIMX=	5.17800868E-06
I=	111	JMARK=	78	KMARK=	1	DPHIMX=	5.12484028E-06
I=	112	JMARK=	78	KMARK=	1	DPHIMX=	5.07213074E-06
I=	113	JMARK=	78	KMARK=	1	DPHIMX=	5.01920210E-06
I=	114	JMARK=	78	KMARK=	1	DPHIMX=	4.96572884E-06

SUBROUTINE RESULT

SHOCK WAVE AND SONIC LINE LOCATIONS

J	XW(J)	SLAS(J,1)	SLAS(J,2)	SLAS(J,3)	SLAS(J,4)	SLAS(J,5)	SLAS(J,6)
18	-2.400000000E-01	0.	0.	0.	0.	0.	0.
19	-2.200000000E-01	0.	0.	0.	0.	0.	0.
20	-2.000000000E-01	0.	0.	0.	0.	0.	0.
21	-1.800000000E-01	0.	0.	0.	0.	0.	0.
22	-1.600000000E-01	0.	0.	0.	0.	0.	0.
23	-1.400000000E-01	0.	0.	0.	0.	0.	0.
24	-1.200000000E-01	0.	0.	0.	0.	0.	0.
25	-1.000000000E-01	0.	0.	0.	0.	0.	0.
26	-8.000000000E-02	0.	0.	0.	0.	0.	0.
27	-6.000000000E-02	0.	0.	0.	0.	0.	0.
28	-4.000000000E-02	0.	0.	0.	0.	0.	0.
29	-2.000000000E-02	0.	0.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.
31	2.000000000E-02	0.	0.	0.	0.	0.	0.
32	4.000000000E-02	0.	0.	0.	0.	0.	0.
33	6.000000000E-02	0.	0.	0.	0.	0.	0.
34	8.000000000E-02	0.	0.	0.	0.	0.	0.
35	1.000000000E-01	0.	0.	0.	0.	0.	0.
36	1.200000000E-01	0.	0.	0.	0.	0.	0.
37	1.400000000E-01	0.	0.	0.	0.	0.	0.
38	1.600000000E-01	0.	0.	0.	0.	0.	0.
39	1.800000000E-01	0.	0.	0.	0.	0.	0.
40	2.000000000E-01	0.	0.	0.	0.	0.	0.
41	2.200000000E-01	0.	0.	0.	0.	0.	0.
42	2.400000000E-01	0.	0.	0.	0.	0.	0.
43	2.600000000E-01	0.	0.	0.	0.	0.	0.
44	2.800000000E-01	6.301807478E-02	0.	0.	0.	0.	0.
45	3.000000000E-01	9.203879566E-02	0.	0.	0.	0.	0.
46	3.200000000E-01	1.378954545E-01	0.	0.	0.	0.	0.
47	3.400000000E-01	1.916386808E-01	0.	0.	0.	0.	0.
48	3.600000000E-01	2.498875775E-01	0.	0.	0.	0.	0.
49	3.800000000E-01	3.088346448E-01	0.	0.	0.	0.	0.
50	4.000000000E-01	3.622532e55E-01	0.	0.	0.	0.	0.
51	4.200000000E-01	3.992845798E-01	0.	0.	0.	0.	0.
52	4.400000000E-01	4.185d23585E-01	0.	0.	0.	0.	0.
53	4.600000000E-01	3.46776d44E-01	0.	0.	0.	0.	0.
54	4.800000000E-01	2.521933355E-01	0.	0.	0.	0.	0.
55	5.000000000E-01	2.197107715E-01	0.	0.	0.	0.	0.
56	5.200000000E-01	3.578094324E-01	0.	0.	0.	0.	0.
57	5.400000000E-01	4.771602405E-01	0.	0.	0.	0.	0.
58	5.600000000E-01	5.852976065E-01	0.	0.	0.	0.	0.
59	5.800000000E-01	6.738184195E-01	0.	0.	0.	0.	0.
60	6.000000000E-01	7.678019995E-01	0.	0.	0.	0.	0.
61	6.200000000E-01	8.439965705E-01	0.	0.	0.	0.	0.
62	6.400000000E-01	9.034822035E-01	0.	0.	0.	0.	0.
63	6.600000000E-01	9.393035445E-01	0.	0.	0.	0.	0.
64	6.800000000E-01	9.142235715E-01	0.	0.	0.	0.	0.
65	7.000000000E-01	8.415535365E-01	0.	0.	0.	0.	0.
66	7.200000000E-01	7.093541475E-01	0.	0.	0.	0.	0.
67	7.400000000E-01	3.871873e55E-01	0.	0.	0.	0.	0.
68	7.600000000E-01	2.814136395E-01	2.58216644E-01	0.	0.	0.	0.
69	7.800000000E-01	0.	0.	0.	0.	0.	0.
70	8.000000000E-01	0.	0.	0.	0.	0.	0.
71	8.200000000E-01	0.	0.	0.	0.	0.	0.
72	8.400000000E-01	0.	0.	0.	0.	0.	0.
73	8.600000000E-01	0.	0.	0.	0.	0.	0.
74	8.800000000E-01	0.	0.	0.	0.	0.	0.
75	9.000000000E-01	0.	0.	0.	0.	0.	0.
76	9.200000000E-01	0.	0.	0.	0.	0.	0.
77	9.400000000E-01	0.	0.	0.	0.	0.	0.
78	9.600000000E-01	0.	0.	0.	0.	0.	0.
79	9.800000000E-01	0.	0.	0.	0.	0.	0.
80	1.000000000E+00	0.	0.	0.	0.	0.	0.
81	1.020000000E+00	0.	0.	0.	0.	0.	0.
82	1.040000000E+00	0.	0.	0.	0.	0.	0.
83	1.060000000E+00	0.	0.	0.	0.	0.	0.
84	1.080000000E+00	0.	0.	0.	0.	0.	0.
85	1.100000000E+00	0.	0.	0.	0.	0.	0.
86	1.120000000E+00	0.	0.	0.	0.	0.	0.
87	1.140000000E+00	0.	0.	0.	0.	0.	0.
88	1.160000000E+00	0.	0.	0.	0.	0.	0.
89	1.180000000E+00	0.	0.	0.	0.	0.	0.
90	1.200000000E+00	0.	0.	0.	0.	0.	0.
91	1.220000000E+00	0.	0.	0.	0.	0.	0.
92	1.240000000E+00	0.	0.	0.	0.	0.	0.

PRESSURE COEFFICIENTS AT GRID POINTS
1 GENERAL POINTS (COMPUTATIONAL APPROXIMATION)
2 POINTS UNDER WING (COMPUTATIONAL APPROXIMATION)
3 POINTS ABOVE WING
4 POINTS UNDER WING

1 18 92

5.68241778E-03	6.69193782E-03	7.88788706E-03	9.32403210E-03	1.10766237E-02	1.32575840E-02	1.60384000E-02	1.96967624E-02
2.47169975E-02	3.20373605E-02	4.37821061E-02	6.59380537E-02	1.18668625E-01	1.60861984E-01	1.61322847E-01	1.49962474E-01
1.32880898E-01	1.12355670E-01	8.94716439E-02	6.48281619E-02	3.88026310E-02	1.16700849E-02	-1.63383416E-02	-4.50219559E-02
-7.44510431E-02	-9.66972527E-02	-1.04020081E-01	-1.19664065E-01	-1.33917311E-01	-1.47158344E-01	-1.59453225E-01	-1.71925014E-01
-1.83706201E-01	-1.94740243E-01	-2.06779808E-01	-2.21657437E-01	-2.37967031E-01	-2.52768061E-01	-2.65165151E-01	-2.77760674E-01
-2.91518367E-01	-3.04661636E-01	-3.15257774E-01	-3.22400352E-01	-3.25866547E-01	-3.25637424E-01	-3.21696483E-01	-3.13944656E-01
-3.02071914E-01	-2.85093745E-01	-2.57517973E-01	6.91137184E-04	1.07179102E-01	1.13519563E-01	1.09918466E-01	1.13306546E-01
1.21820085E-01	1.33151109E-01	1.45113117E-01	1.55594842E-01	1.62057098E-01	1.65479018E-01	1.20272622E-01	6.55062319E-02
4.21116383E-02	2.99721455E-02	2.27364642E-02	1.79944054E-02	1.46558305E-02	1.21721789E-02	1.02455963E-02	8.70332974E-03
7.43896738E-03	6.38332761E-03	5.48927677E-03					

1 43 78

1.14056880E-02	-5.62638699E-03	-2.07606939E-02	-3.57228670E-02	-4.25867121E-02	-5.53354805E-02	-7.12419322E-02	-7.95507163E-02
-8.49797099E-02	-8.27825866E-02	-6.17962535E-02	-2.05448804E-02	-5.75113107E-03	-9.52979430E-03	-2.23632505E-02	-3.40374410E-02
-4.84852709E-02	-5.69139624E-02	-6.84645834E-02	-7.60227956E-02	-8.58019109E-02	-9.26525296E-02	-9.50986094E-02	-9.60968577E-02
6.01117649E-03	3.58882030E-02	6.67043851E-02	1.09436832E-01	1.35424338E-01	1.49522368E-01	1.37142097E-01	1.44706174E-01
1.54577720E-01	1.64589031E-01	1.72656513E-01	1.76306379E-01				

2 18 92

5.67726596E-03	6.68506703E-03	7.87852737E-03	9.31094477E-03	1.10977170E-02	1.32291086E-02	1.59931040E-02	1.96191254E-02
2.45687561E-02	3.17023189E-02	4.27827003E-02	6.15433769E-02	9.32614671E-02	1.17891575E-01	1.21575114E-01	1.16112611E-01
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-1.58899365E-01	-1.69J882558E-01	-1.80732650E-01	-1.95262372E-01	-2.10582889E-01	-2.24806707E-01	-2.37788113E-01	-2.51163319E-01
-2.64977751E-01	-2.77769994E-01	-2.88281606E-01	-2.95389840E-01	-3.00290411E-01	-3.01359279E-01	-2.99049815E-01	-2.93262354E-01
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1.05116422E-01	1.10814194E-01	1.16848950E-01	1.21273977E-01	1.22047944E-01	1.22246135E-01	9.45972639E-02	6.09193078E-02
4.10367317E-02	2.96127572E-02	2.25833792E-02	1.79184084E-02	1.46136951E-02	1.21467088E-02	1.02291049E-02	8.69205558E-03
7.43092412E-03	6.37739414E-03	5.48478250E-03					

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-3.31500886E-02	1.03244694E-02	-2.43510511E-03	-1.53124151E-02	-2.74711348E-02	-3.31596250E-02	-4.75990107E-02	-5.45294759E-02
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-2.30882429E-02	-3.33673239E-02	-4.31764185E-02	-5.15108644E-02	-6.27279919E-02	-7.08959182E-02	-7.50724065E-02	-1.38410679E-02
-1.85046966E-02	4.56802710E-02	7.15352879E-02	9.94043289E-02	9.49965028E-02	1.26028375E-01	1.36575460E-01	1.25888749E-01
1.30385627E-01	1.34783511E-01	1.37177803E-01	1.35581924E-01				

3 18 92

5.66743092E-03	6.67195725E-03	7.86068150E-03	9.28801688E-03	1.10217588E-02	1.31750791E-02	1.59074977E-02	1.94734758E-02
2.42950870E-02	3.11097409E-02	4.12297656E-02	5.86653217E-02	7.80662062E-02	9.45[illegible]E-02	9.89419479E-02	9.64683332E-02
8.99059247E-02	8.07892683E-02	7.00294134E-02	5.82115623E-02	4.57354118E-02	3.26[illegible]E-02	1.98726900E-02	6.82439331E-03
-6.34261230E-03	-1.90511480E-02	-3.17249651E-02	-4.34137148E-02	-4.96795612E-02	-6.03760455E-02	-7.10235816E-02	-1.33119135E-01
-1.43151339E-01	-1.53076925E-01	-1.64983452E-01	-1.75550990E-01	-1.93514450E-01	-2.07228817E-01	-2.21481399E-01	-2.35070108E-01
-2.49157413E-01	-2.60772288E-01	-2.70363553E-01	-2.77599979E-01	-2.82277965E-01	-2.83[illegible]E-01	-2.82359593E-01	-2.77648396E-01
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9.67399C18E-02	9.84625284E-02	1.00810675E-01	1.01221607E-01	9.91094062E-02	9.84187742E-02	7.89636809E-02	5.57411717E-02
3.93525869E-02	2.83764855E-02	2.23112616E-02	1.77761346E-02	1.45341946E-02	1.20984347E-02	1.01977599E-02	8.67038771E-03
7.41558960E-03	6.36607244E-03	5.47620190E-03					

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-1.90511880E-02	-3.17249651E-02	-4.34132148E-02	-4.96795612E-02	-6.03760495E-02	-7.10235816E-02	-3.25975265E-02	-3.84891879E-02
-4.29313464E-02	-3.93058347E-02	-1.12586878E-02	2.40308830E-02	3.87648634E-02	3.50916422E-02	2.19990869E-02	4.75777729E-03
-6.69832684E-03	-1.71465788E-02	-2.73112209E-02	-3.59866007E-02	-4.73000455E-02	-5.58438542E-02	-6.07369705E-02	-3.11211264E-03
2.76644464E-02	5.35136334E-02	7.60251349E-02	9.66892586E-02	8.93128727E-02	1.20138150E-01	1.29863729E-01	1.15706873E-01
1.16871704E-01	1.17760355E-01	1.16654039E-01	1.12122165E-01				

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9.05552222E-02	9.39765801E-02	9.51378564E-02	9.27138872E-02				

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4.68255613E-02	7.62481999E-02	1.01579788E-01	1.24042069E-01	1.37749239E-01	1.62340685E-01	1.66310861E-01	1.47699854E-01
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4 18 92

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2.39014305E-02 3.03317134E-02 3.93823554E-02 5.19660610E-02 6.73251810E-02 7.90523554E-02 8.32053314E-02 8.20961390E-02
7.75228376E-02 7.06267633E-02 6.21437308E-02 5.25703523E-02 4.22568696E-02 3.14602037E-02 2.03713809E-02 9.12204887E-03
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1.06030497E-01 1.04962580E-01 1.01855496E-01 9.57367724E-02

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1.34108795E-01 1.29926255E-01 1.24933379E-01 1.16581721E-01

5 18 92

5.63201781E-03 6.62483001E-03 7.79667263E-03 9.19688882E-03 1.08937867E-02 1.29841579E-02 1.56085081E-02 1.89752195E-02
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1.33507528E-02	1.27483018E-02	1.18946419E-02	1.07968461E-02	9.46586667E-03	7.91869542E-03	6.16236586E-03	4.22384446E-03	
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5.34031483E-03	4.72804395E-03	4.16903922E-03						

21 18 92								
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9.60910201E-03	1.03379452E-02	1.10003721E-02	1.15638564E-02	1.19962156E-02	1.22682322E-02	1.23557712E-02	1.24100037E-02	
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9.9797838E-02	1.0033070E-01	1.0086341E-01	1.0139596E-01	1.0192835E-01	1.0246058E-01	1.0299265E-01	1.0352456E-01
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1.3357890E-01	1.3410152E-01	1.3462398E-01	1.3514627E-01	1.3566841E-01	1.3619038E-01	1.3671219E-01	1.3723384E-01
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2.1905646E-01	2.1955052E-01	2.2004439E-01	2.2053807E-01	2.2103156E-01	2.2152486E-01	2.2201797E-01	2.2251089E-01
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2.9715058E-01	2.9630815E-01	2.9542012E-01	2.9448661E-01	2.9350776E-01	2.9248372E-01	2.9141464E-01	2.9030071E-01
2.8914211E-01	2.8793906E-01	2.8669180E-01	2.8540059E-01	2.8406570E-01	2.8268742E-01	2.8126607E-01	2.7980199E-01
2.7829555E-01	2.7674715E-01	2.7515722E-01	2.7352622E-01	2.7185464E-01	2.7014300E-01	2.6839187E-01	2.6660186E-01
2.6477363E-01	2.6290787E-01	2.6100530E-01	2.5906669E-01	2.5709287E-01	2.5508470E-01	2.5304309E-01	2.5096900E-01
2.4886345E-01	2.4672747E-01	2.4456211E-01	2.4236844E-01	2.4014760E-01	2.3790080E-01	2.3562931E-01	2.3333446E-01
2.3101763E-01	2.2868024E-01	2.2632375E-01	2.2394966E-01	2.2155952E-01	2.1915492E-01	2.1673750E-01	2.1430894E-01
2.1187096E-01	2.0942540E-01	2.0697406E-01	2.0451882E-01	2.0206158E-01	1.9960430E-01	1.9714897E-01	1.9469762E-01
1.9225230E-01	1.8981508E-01	1.8738806E-01	1.8497336E-01	1.8257314E-01	1.8018960E-01	1.7782498E-01	1.7548159E-01
1.7316178E-01	1.7086797E-01	1.6860259E-01	1.6636814E-01	1.6416719E-01	1.6200236E-01	1.5987633E-01	1.5779183E-01
1.5575164E-01	1.5375859E-01	1.5181557E-01	1.4992552E-01	1.4809144E-01	1.4631641E-01	1.4460357E-01	1.4295614E-01
1.4137744E-01	1.3987086E-01	1.3843980E-01	1.3708775E-01	1.3581827E-01	1.3463500E-01	1.3354166E-01	1.3254202E-01
1.3163990E-01	1.3083918E-01	1.3014381E-01	1.2956772E-01	1.2911488E-01	1.2878923E-01	1.2859468E-01	1.2853511E-01
1.2861435E-01	1.2883618E-01	1.2920437E-01	1.2972264E-01	1.3039464E-01	1.3122395E-01	1.3221407E-01	1.3336840E-01
1.3469026E-01	1.3618284E-01	1.3784918E-01	1.3969218E-01	1.4171455E-01	1.4391880E-01	1.4630722E-01	1.4888191E-01
1.5164477E-01	1.5460760E-01	1.5776966E-01	1.6113060E-01	1.6468966E-01	1.6844572E-01	1.7239731E-01	1.7654257E-01
1.8087930E-01	1.8540494E-01	1.9011660E-01	1.9501102E-01	2.0008464E-01	2.0533350E-01	2.1075331E-01	2.1633944E-01
2.2208695E-01	2.2799055E-01	2.3404468E-01	2.4024350E-01	2.4658100E-01	2.5305102E-01	2.5964737E-01	2.6636386E-01
2.7319435E-01	2.8012282E-01	2.8714332E-01	2.9424010E-01	3.0139772E-01	3.0860112E-01	3.1583570E-01	3.2308733E-01
3.3034252E-01	3.3758844E-01	3.4481300E-01	3.5200481E-01	3.5915326E-01	3.6624844E-01	3.7328109E-01	3.8024260E-01
3.8712494E-01	3.9392060E-01	4.0062350E-01	4.0722800E-01	4.1372870E-01	4.2012020E-01	4.2639705E-01	4.3255366E-01
4.3858417E-01	4.4448284E-01	4.5025284E-01	4.5588722E-01	4.6137844E-01	4.6671844E-01	4.7189870E-01	4.7691012E-01
4.8174307E-01	4.8639772E-01	4.9086284E-01	4.9512772E-01	4.9917997E-01	5.0300645E-01	5.0659331E-01	5.0992588E-01
5.1298870E-01	5.1576000E-01	5.1822966E-01	5.2037766E-01	5.2218400E-01	5.2362870E-01	5.2469176E-01	5.2535320E-01
5.2559303E-01	5.2539126E-01	5.2474790E-01	5.2365297E-01	5.2209648E-01	5.2006844E-01	5.1755887E-01	5.1455779E-01
5.1105523E-01	5.0704121E-01	5.0251574E-01	4.9747886E-01	4.9193060E-01	4.8587100E-01	4.7930010E-01	4.7221794E-01
4.6462455E-01	4.5652000E-01	4.4790437E-01	4.3876772E-01	4.2911010E-01	4.1893157E-01	4.0823220E-01	3.9701206E-01
3.8527123E-01	3.7301000E-01	3.6022822E-01	3.4692597E-01	3.3310335E-01	3.1876050E-01	3.0389755E-01	2.8851468E-01
2.7261208E-01	2.5619000E-01	2.3924866E-01	2.2178826E-01	2.0380907E-01	1.8531139E-01	1.6629557E-01	1.4676203E-01
1.2671124E-01	1.0614360E-01	8.5059455E-02	6.3459172E-02	4.1344284E-02	1.8715139E-02	-4.4172000E-03	-2.7124000E-02
-5.0048000E-02	-7.3191000E-02	-9.6640000E-02	-1.0000000E-01				

24	18	92					
3.3791760E-03	3.8182840E-03	4.2804920E-03	4.7479128E-03	5.2609488E-03	5.7676980E-03	6.2751589E-03	6.7712703E-03
7.2429036E-03	7.6747866E-03	8.1504059E-03	8.3530315E-03	8.6076697E-03	8.6766394E-03	8.6663240E-03	8.5030994E-03
8.2597226E-03	7.4493088E-03	7.2988650E-03	6.8607697E-03	5.7791137E-03	4.8182000E-03	3.7317887E-03	2.8285693E-03
1.2194140E-03	-1.8429100E-03	-1.6668767E-03	-3.2096358E-03	-4.7884744E-03	-6.3717107E-03	-7.9165655E-03	-9.3651445E-03
-1.0644320E-02	-1.1562329E-02	-1.2461313E-02	-1.2913531E-02	-1.2960834E-02	-1.2827952E-02	-1.2486772E-02	-1.1944961E-02
-2.1913496E-02	-2.4584154E-02	-2.7436298E-02	-3.0317593E-02	-3.2932746E-02	-3.4890602E-02	-3.4916352E-02	-3.2608564E-02
-1.6052545E-02	-7.9833401E-03	-2.5362199E-03	1.5076829E-03	4.5314706E-03	6.8115847E-03	8.5405084E-03	9.7609555E-03
1.0534159E-02	1.0940216E-02	1.1036732E-02	1.0885102E-02	1.0547414E-02	1.0102026E-02	9.5826779E-03	9.0391922E-03
8.4772426E-03	7.9167837E-03	7.3579436E-03	6.8049228E-03	6.2596413E-03	5.7265794E-03	5.2153244E-03	4.7239981E-03
4.2561255E-03	3.8148354E-03	3.4900621E-03					

25	18	92					
3.1408440E-03	3.5379973E-03	3.9523238E-03	4.3603656E-03	4.8183965E-03	5.2293723E-03	5.6954695E-03	6.1171406E-03
6.5130466E-03	6.8703434E-03	7.1765695E-03	7.4173394E-03	7.5799052E-03	7.6452211E-03	7.6242479E-03	7.4873133E-03
7.2435068E-03	6.8642301E-03	6.3722288E-03	5.7659247E-03	5.0281769E-03	4.1830621E-03	3.2267558E-03	2.1695311E-03
1.0195837E-03	-2.1268377E-04	-1.5138046E-03	-3.0544088E-03	-4.2567290E-03	-5.2617364E-03	-6.9918311E-03	-8.2679797E-03
-9.4136262E-03	-1.0383390E-02	-1.1179461E-02	-1.1938761E-02	-1.2814466E-02	-1.4126111E-02	-1.5884640E-02	-1.7824359E-02
-1.9903415E-02	-2.2266864E-02	-2.4867445E-02	-2.7049150E-02	-2.9004014E-02	-2.9668184E-02	-2.7445511E-02	-2.1449957E-02
-1.3984137E-02	-7.7693368E-03	-2.1180127E-03	4.1056354E-03	9.3265744E-03	1.3811762E-02	1.6805475E-03	1.9313267E-02
8.6944241E-03	9.1491980E-03	9.3436824E-03	9.3265744E-03	9.1444983E-03	8.8902112E-03	8.4733275E-03	8.0511177E-03
7.6018528E-03	7.1373145E-03	6.6650532E-03	6.1906118E-03	5.7191384E-03	5.2552386E-03	4.8031438E-03	4.3660479E-03
3.9481173E-03	3.5501237E-03	3.1737862E-03					

26	18	92					
2.8938106E-03	3.2501687E-03	3.6183177E-03	3.9954731E-03	4.3770740E-03	4.7574359E-03	5.1295539E-03	5.4851521E-03
5.8148338E-03	6.1083499E-03	6.3549675E-03	6.5432449E-03	6.6647722E-03	6.7080066E-03	6.6654660E-03	6.5201428E-03
6.2969027E-03	5.9822752E-03	5.5324491E-03	4.9834457E-03	4.3346134E-03	3.5956333E-03	2.7632543E-03	1.8393035E-03
8.3520751E-04	-2.1998504E-04	-1.3746437E-03	-2.5334957E-03	-3.7594460E-03	-4.9679226E-03	-6.1505704E-03	-7.2730329E-03
-8.2991171E-03	-9.2013978E-03	-9.9913765E-03	-1.0732418E-02	-1.1607039E-02	-1.2911643E-02	-1.4664407E-02	-1.6203144E-02
-1.8052046E-02	-1.9997330E-02	-2.1957293E-02	-2.3797122E-02	-2.5584718E-02	-2.6897685E-02	-2.6615380E-02	-1.4782666E-02
-1.2257406E-02	-7.4307554E-03	-3.5182649E-03	4.4999842E-04	1.4963294E-03	3.8454747E-03	5.2887055E-03	6.3304635E-03
7.0722257E-03	7.4584919E-03	7.8172387E-03	7.8982517E-03	7.8326356E-03	7.6556594E-03	7.4018705E-03	7.0892371E-03
6.7394117E-03	6.3669431E-03	5.9749084E-03	5.5781849E-03	5.1745761E-03	4.7753018E-03	4.3811769E-03	3.9984958E-03
3.6281325E-03	3.2729026E-03	2.9349905E-03					

27	18	92					
2.6398360E-03	2.9564765E-03	3.2480944E-03	3.6101449E-03	3.9395262E-03	4.2652610E-03	4.5830815E-03	4.8774308E-03
5.1495655E-03	5.3891823E-03	5.5884864E-03	5.7335058E-03	5.8174164E-03	5.8370544E-03	5.7851704E-03	5.6538348E-03
5.4395684E-03	5.1994704E-03	4.7517917E-03	4.2760209E-03	3.7144101E-03	3.0561344E-03	2.3413364E-03	1.5351408E-03
6.6613649E-04	-2.6387620E-04	-1.2276019E-03	-2.2269925E-03	-3.3103312E-03	-4.3376281E-03	-5.3859926E-03	-6.3706471E-03
-7.2872205E-03	-8.1220709E-03	-8.8832079E-03	-9.5181266E-03	-1.0458001E-02	-1.1644284E-02	-1.3023813E-02	-1.4581135E-02
-1.6164867E-02	-1.7744134E-02	-1.9297958E-03	-2.0819233E-02	-2.2134097E-02	-2.2905454E-02	-2.2078579E-02	-1.8623586E-02
-1.0731659E-02	-6.9239494E-03	-3.1146526E-03	-1.6992590E-03	1.0086199E-03	2.6785790E-03	3.9726453E-03	4.9407654E-03
5.6501113E-03	6.1412904E-03	6.4471796E-03	6.5675295E-03	6.6139249E-03	6.4900776E-03	6.3793638E-03	6.1604937E-03
5.8588196E-03	5.6066774E-03	5.2973997E-03	4.9649535E-03	4.6249180E-03	4.2907775E-03	3.9537466E-03	3.6218039E-03
3.2980592E-03	2.9847562E-03	2.6818923E-03					

28	18	92					
2.3809970E-03	2.6277959E-03	2.9429489E-03	3.2276230E-03	3.5100189E-03	3.7857599E-03	4.0497119E-03	4.2960932E-03
4.5185925E-03	4.7105334E-03	4.8600777E-03	4.9675544E-03	5.0381528E-03	5.0382206E-03	4.9793673E-03	4.8541582E-03
4.6599115E-03	4.3917880E-03	4.0907943E-03	3.6958407E-03	3.1477345E-03	2.5084015E-03	1.7690161E-03	1.2495603E-03
5.1993462E-04	-2.8121476E-04	-1.1294917E-03	-2.0023363E-03	-2.8993721E-03	-3.8007857E-03	-4.6890354E-03	-5.5504648E-03
-6.3696070E-03	-7.1249126E-03	-7.8431295E-03	-8.4711691E-03	-9.4134735E-03	-1.0441552E-02	-1.1670758E-02	-1.2959868E-02
-1.4260414E-02	-1.5534864E-02	-1.6701137E-02	-1.7744990E-02	-1.8756914E-02	-1.9787574E-02	-2.0807680E-02	-2.1530638E-02
-9.3459778E-03	-6.3622264E-03	-3.7449450E-03	-1.5499719E-03	4.2468211E-04	2.1710592E-03	3.4159281E-03	4.4814955E-03
4.4140855E-03	4.0978743E-03	3.7420177E-03	3.4224938E-03	3.1429115E-03	2.9099481E-03	2.7152638E-03	2.5274468E-03
5.0886233E-03	4.9891119E-03	4.8625785E-03	4.7049160E-03	4.5261902E-03	4.3301104E-03	4.1221616E-03	3.9023643E-03
2.6602260E-03	2.6876232E-03	2.7233172E-03					

29	18	92					
2.1197018E-03	2.3626810E-03	2.6071677E-03	2.8510337E-03	3.0904879E-03	3.3219489E-03	3.5411298E-03	3.7432945E-03
3.9233527E-03	4.0739850E-03	4.1957891E-03	4.2774654E-03	4.3158622E-03	4.3158622E-03	4.2744765E-03	4.1927738E-03
3.9919623E-03	3.7160439E-03	3.4188713E-03	3.0993767E-03	2.7603931E-03	2.4039857E-03	2.0327776E-03	1.6511276E-03
3.9170851E-04	-2.9054200E-04	-1.4110420E-03	-1.9350780E-03	-2.5221270E-03	-3.2333900E-03	-4.0554639E-03	-4.8022189E-03
-5.5188043E-03	-6.2016370E-03	-6.8861191E-03	-7.5831059E-03	-8.3055950E-03	-9.2279760E-03	-1.0427539E-02	-1.1734836E-02
-1.2399038E-02	-1.3380749E-02	-1.4714169E-02	-1.6037483E-02	-1.7477287E-02	-1.8941518E-02	-1.9956509E-02	-2.0440486E-02
-8.0719709E-03	-5.7522556E-03	-3.0036460E-03	-1.4839776E-03	-4.1139899E-04	9.4994819E-04	1.8543044E-03	2.4740132E-03
3.3522195E-03	3.9147385E-03	4.1490751E-03	4.1780444E-03	4.0955613E-03	3.9152536E-03	3.6907693E-03	3.4386011E-03
4.2168556E-03	4.1611473E-03	4.0760140E-03	3.9722553E-03	3.8553875E-03	3.7252538E-03	3.5907693E-03	3.4538092E-03
2.6174930E-03	2.5889997E-03	2.5654754E-03					

30	18	92					
1.8587029E-03	2.0681609E-03	2.2772797E-03	2.4836859E-03	2.6846197E-03	2.8769241E-03	3.0537085E-03	3.2212569E-03
3.3654015E-03	3.4851660E-03	3.5767736E-03	3.6356287E-03	3.6657222E-03	3.6643014E-03	3.5788481E-03	3.4711239E-03
3.3151925E-03	3.1092984E-03	2.8525276E-03	2.5444863E-03	2.1862177E-03	1.7784723E-03	1.3234969E-03	8.2421237E-04
2.8443172E-04	-2.9126286E-03	-8.9736915E-04	-1.5270346E-03	-2.1720497E-03	-2.8251562E-03	-3.4759611E-03	-4.1161015E-03
-4.7383819E-03	-5.3413560E-03	-5.9331221E-03	-6.5377686E-03	-7.2176786E-03	-8.0124361E-03	-8.9872413E-03	-9.7844737E-03
-1.0538839E-02	-1.1318482E-02	-1.1886647E-02	-1.2186077E-02	-1.2066235E-02	-1.1429554E-02	-1.0259278E-02	-8.6810015E-03
-6.9014233E-03	-5.1135827E-03	-3.4443810E-03	-1.9774027E-03	-7.1148026E-04	3.4659534E-04	1.2124918E-03	1.9035514E-03
2.4539612E-03	2.8835105E-03	3.2077665E-03	3.4373115E-03	3.5854540E-03	3.6706225E-03	3.6908267E-03	3.6814772E-03
3.5909757E-03	3.4868326E-03	3.3539487E-03	3.2029594E-03	3.0340353E-03	2.8533127E-03	2.6439621E-03	2.4697778E-03
2.2733104E-03	2.0708875E-03	1.8824088E-03					

31	18	92						
1.60110492E-03	1.77933249E-03	1.95021402E-03	2.12908045E-03	2.29583307E-03	2.45358815E-03	2.60031567E-03	2.73739885E-03	
2.86430[illegible]E-03	2.97[illegible]E-03	3.08829226E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	
2.74611163E-03	2.59700306E-03	2.43030765E-03	2.26485240E-03	1.78812502E-03	1.[illegible]E-03	1.[illegible]E-03	1.[illegible]E-03	
1.98735522E-04	-2.80761795E-04	-1.85414617E-04	-1.[illegible]E-03	-1.48850506E-03	-2.29465176E-03	-2.94185059E-03	-3.43088253E-03	
-4.01577715E-03	-4.52358838E-03	-5.04847377E-03	-5.[illegible]E-03	-6.15862673E-03	-6.82353092E-03	-7.53794311E-03	-8.23826388E-03	
-8.86142727E-03	-9.38955514E-03	-9.75886432E-04	-9.90377213E-03	-9.74075548E-03	-9.21387623E-03	-8.32743151E-03	-7.15622185E-03	
-5.82932265E-03	-4.26674730E-03	-3.10655748E-03	-1.95466330F-03	-5.70512626E-04	-9.48271667E-05	6.33443210E-04	1.22613043E-03	
1.70002712E-03	2.09251514E-03	2.39964418E-03	2.62786582E-03	2.78893373E-03	2.89130454E-03	2.94164422E-03	2.94834029E-03	
2.91784250E-03	2.85507109E-03	2.76838545E-03	2.65958758E-03	2.53394934E-03	2.39524416E-03	2.24678922E-03	2.09149001E-03	
1.93162426E-03	1.76997296E-03	1.60774975E-03						

32	18	92						
1.35337188E-03	1.50046974F-03	1.64787660E-03	1.79091397E-03	1.92769279E-03	2.05613027E-03	2.17397582E-03	2.27884572E-03	
2.36826577E-03	2.43972000F-03	2.49070775E-03	2.51879440E-03	2.52167456E-03	2.49722472E-03	2.44355626E-03	2.35903606E-03	
2.24246731E-03	2.09285245F-03	1.90970242E-03	1.69292906E-03	1.44290002E-03	1.16046285E-03	8.46973117E-04	5.04306693E-04	
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-3.34356093E-03	-3.78360569E-03	-4.21303883E-03	-4.65570717E-03	-5.13658326E-03	-5.67950420E-03	-6.24712719E-03	-6.78427969E-03	
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-4.85337774E-03	-3.82913615E-03	-2.83426390E-03	-1.91616987E-03	-1.10521328E-03	-3.98392221E-04	1.99331250E-04	6.94728181E-04	
1.10687621E-03	1.44581006E-03	1.71908893E-03	1.93315437E-03	2.09319721E-03	2.20504707E-03	2.27355132E-03	2.30483498E-03	
2.30384943E-03	2.27461175E-03	2.22180422E-03	2.14910672E-03	2.06001372E-03	1.95767555E-03	1.84491102E-03	1.72422348E-03	
1.59781873E-03	1.46762374E-03	1.33530601E-03						

33	18	92						
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1.93285753E-03	1.98727717E-03	2.02479716E-03	2.04359515E-03	2.04154897E-03	2.01827635E-03	1.97117286E-03	1.89944756E-03	
1.80215596E-03	1.67862992E-03	1.52850488E-03	1.35174427E-03	1.14866144E-03	9.19939020E-04	6.66645244E-04	3.90246361E-04	
9.26132296E-05	-2.24093416E-04	-5.57323079E-04	-9.04051933E-04	-1.26C95664E-03	-1.62450103E-03	-1.99105075E-03	-2.35705179E-03	
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-3.97450494E-03	-3.21582048E-03	-2.46803878E-03	-1.76901462E-03	-1.13948888E-03	-5.83874059E-04	-1.06825934E-04	2.95190047E-04	
6.36137788E-04	9.22765975E-04	1.15996235E-03	1.35184313E-03	1.50162021E-03	1.61306529E-03	1.68958841E-03	1.73543125E-03	
1.75400820E-03	1.74860556E-03	1.72235367E-03	1.67819425E-03	1.61886049E-03	1.54686702E-03	1.46450705E-03	1.37385462E-03	
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2.84216506E-04	5.17561893E-04	7.15146146E-04	8.79792113E-04	1.01205971E-03	1.11541416E-03	1.19161589E-03	1.24355240E-03	
1.27342754E-03	1.28356383F-03	1.27615609F-03	1.25334051E-03	1.21714708E-03	1.16946413F-03	1.11212731E-03	1.04671383E-03	
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3.70434103E-05	2.18844313E-04	3.72345883E-04	5.09666600E-04	6.20782809E-04	7.10480682E-04	7.80026468E-04	8.31201915E-04	
8.65392703E-04	8.84041613E-04	8.88607598E-04	8.80048262E-04	8.61272027E-04	8.32143656E-04	7.94459059E-04	7.49438227E-04	
6.98219407E-04	6.41853457E-04	5.91313233E-04						

36	18	92						
4.96002040E-04	5.50815240E-04	6.22898323E-04	6.81668965E-04	7.36501295E-04	7.86732478E-04	8.31670838E-04	8.70605379E-04	
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5.31797023E-04	5.532[illegible]7F-04	5.63983744E-04	5.64926539E-04	5.56976793E-04	5.41033129E-04	5.19722447E-04	4.88640129E-04	
4.53862768E-04	4.14343077E-04	3.70856673E-04						

37	18	92						
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6.56695013E-04	6.76967979E-04	6.91058342E-04	6.98763159E-04	6.96066040E-04	6.83869999E-04	6.79538296E-04	6.57887825E-04	
6.28201158E-04	5.90339050E-04	5.44228416E-04	4.89490647E-04	4.27503151E-04	3.57234904E-04	2.79437311E-04	1.94551987E-04	
1.03132425E-04	3.79924460E-06	-9.67139740E-05	-2.03516933E-04	-3.13614959E-04	-4.25915878E-04	-5.39237969E-04	-6.52335203E-04	
-7.63979209E-04	-8.73230715E-04	-9.80284108E-04	-1.08846032E-03	-1.20572088E-03	-1.33444594E-03	-1.46699926E-03	-1.56663807E-03	
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2.72478048E-04	2.92485668E-04	3.04874417E-04	3.10139546E-04	3.08794435E-04	3.01369009E-04	2.88497551E-04	2.70410467E-04	
2.47927719E-04	2.21433752E-04	1.91473756E-04						

38	18	92						
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4.60858329E-04	4.77662231E-04	4.90371568E-04	4.98687703E-04	5.02330040E-04	5.01042188E-04	4.94598154E-04	4.82880822E-04	
4.65527116E-04	4.42655245E-04	4.14149301E-04	3.80023407E-04	3.40357206E-04	2.95296884E-04	2.45059752E-04	1.89936855E-04	
1.30294180E-04	6.65391535E-05	-8.44201570E-07	-7.12617214E-05	-1.44048928E-04	-2.18476528E-04	-2.93758598E-04	-3.65061707E-04	
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-2.35521493E-04	-1.76527056E-04	-1.22915036E-04	-7.[illegible]E-05	-3.17511630E-05	5.48[illegible]E-06	3.41[illegible]E-05	6.35697267E-05	
8.46588887E-05	1.00590155E-04	1.11534619E-04	1.17698080E-04	1.19318322E-04	1.16052[illegible]E-04	1.05964926E-04	9.95923629E-05	
8.57682245E-05	6.88041701E-05	4.89898856E-05						

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 [illegible]  [illegible]  3.39473618E-04  [illegible]  3.45594608E-04  3.57380987E-04  3.56854067E-04  3.52074370E-04
 3.4550601?E-04  3.34070?0?E-04  3.19181378E-04  3.00574342E-04  2.78307225E-04  [illegible]  2.23143725E-04  1.90539310E-04
 1.54859221E-04  1.16342?3?E-04  7.627???4?E-05  2.20204759E-05  1.30146851E-05 -5.99016795E-05 -1.06645777E-04 -1.54256742E-04
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-1.49056084E-04 -1.43339321E-04 -1.36418067E-04 -1.30633608E-04 -1.26427100E-04 -1.23601800E-04 -1.22551086E-04 -1.22724208E-04
-1.22217478E-04  [illegible] -1.23057767E-04 -1.23763274E-04 -1.23410624E-04  [illegible] -1.22089123E-04 -1.21162225E-04
-1.20145972E-04 -1.19379311E-04 -1.18063980E-04 -1.17157930E-04 -1.16426750E-04  [illegible] -1.15843960E-04 -1.16125594E-04
-1.16687753E-04 -1.17848184E-04 -1.19660571E-04

 43   18   92
 2.10250276E-05  2.92059029E-05  3.73224324E-05  4.53679553E-05  5.32300675E-05  6.11906441E-05  6.89259726E-05  7.65069971E-05
 8.38996712E-05  9.10564190E-05  9.79616935E-05  1.04542654E-04  1.10759793E-04  [illegible]  1.21901046E-04  1.2572?289E-04
 1.30578319E-04  1.34618021E-04  1.37599488E-04  1.39077917E-04  1.41417073E-04  [illegible]  1.42150159E-04  1.41451217E-04
 1.39638607E-04  1.37128421E-04  1.33780069E-04  1.29560600E-04  1.24623107E-04  [illegible]  1.12166006E-04  1.04159444E-04
 9.72841789E-05  8.87437158E-05  [illegible]  [illegible]  5.60649399E-05  [illegible]  2.32689795E-05  5.06091223E-06
-1.11329304E-05 -2.75284454E-05  [illegible]  [illegible]  [illegible] -7.91355139E-05  [illegible] -8.85593595E-05
-8.96544472E-05 -8.91750120E-05  [illegible]  [illegible] -8.74729171E-05 -8.83437002E-05 -9.00273912E-05  [illegible]
 [illegible]  [illegible]  [illegible]  [illegible] -1.03294764E-04 -1.03717872E-04 -1.03039113E-04  [illegible]
-1.00037044E-04  [illegible] -9.8?914233E-05  [illegible] -9.60546263E-05  [illegible] -9.38097662E-05  [illegible]
-9.20505764E-05 -9.15951340E-05 -9.12609773E-05

 44   18   92
 2.10069750E-05  2.69894270E-05  3.27676256E-05  3.86356564E-05  4.44831130E-05  5.0295??1?E-05  5.60523878E-05  6.17314776E-05
 6.73049841E-05  7.27419243E-05  7.80081543E-05  8.30668665E-05  8.78791509E-05  9.24046???E-05  9.66020411E-05  1.00430061E-04
 1.03847941E-04  1.06816224E-04  1.09297451E-04  1.11257049E-04  1.12663599E-04  1.13489853E-04  1.13713097E-04  1.13315683E-04
 1.12265448E-04  1.10613191E-04  1.08295960E-04  1.05339634E-04  1.01756769E-04  9.75455048E-05  9.27897466E-05  8.74577056E-05
 8.15969645E-05  7.52179154E-05  6.82620414E-05  6.04801656E-05  5.13715449E-05  4.06?77538E-05  2.83665387E-05  1.68661252E-05
 5.07634176E-06 -6.40736558E-06 -1.77?719??E-05 -2.77547638E-05 -3.65399840E-05 -4.40126032E-05 -5.05105149E-05 -5.54623713E-05
-5.72467862E-05 -5.89157656E-05 -6.02264414E-05 -6.16404798E-05 -6.33776982E-05 -6.53755507E-05 -6.76899480E-05 -7.01176067E-05
-7.23839175E-05 -7.43221263E-05 -7.58638276E-05 -7.69809752E-05 -7.76501345E-05 -7.79261?97E-05 -7.79219462E-05 -7.76050644E-05
-7.67068966E-05 -7.56395211E-05 -7.42177064E-05 -7.27173106E-05 -7.11016384E-05 -6.92976?97E-05 -6.74?928?1E-05 -6.55671372E-05
-6.37023391E-05 -6.19461520E-05 -6.03295247E-05

 45   18   92
 1.82997736E-05  2.23729477E-05  2.64666968E-05  3.05701015E-05  3.46889341E-05  3.87959223E-05  4.28803226E-05  4.69235508E-05
 5.09041591E-05  5.47983826E-05  5.35790139E-05  6.22167389E-05  6.56275571E-05  6.89547358E-05  7.19849975E-05  7.47590297E-05
 7.72340159E-05  7.92841617E-05  8.11812278E-05  8.25990390E-05  8.36139727E-05  [illegible]  8.43561789E-05  8.40328426E-05
 8.32860816E-05  8.20434650E-05  8.03411745E-05  7.81624373E-05  7.55310192E-05  7.24512235E-05  6.89416390E-05  6.50294240E-05
 6.07537916E-05  5.60277262E-05  5.10073125E-05  4.54534624E-05  3.91865464E-05  3.20217478E-05  [illegible]  1.64031316E-05
 8.64221844E-06  9.58473179E-07 -6.42073028E-06 -1.34509542E-05 -1.99257641E-05  [illegible]  [illegible]  [illegible]
-3.69780785E-05 -3.93727974E-05 -4.14617962E-05 -4.34806905E-05  [illegible] -4.75795217E-05 -4.96170285E-05 -5.15548959E-05
-5.33300454E-05 -5.47608432E-05 -5.58227817E-05 -5.65364055E-05 -5.68575414E-05 -5.68095997E-05 -5.65779559E-05 -5.59152?73E-05
-5.49951106E-05 -5.37853412E-05 -5.23281590E-05 -5.06591016E-05 -4.88100263E-05 -4.68147876E-05  [illegible] -4.25237005E-05
-4.03021265E-05 -3.80798797E-05 -3.58948455E-05

 46   18   92
 1.34487585E-05  1.60472847E-05  1.86709966E-05  2.13148844E-05  2.39718164E-05  2.66325454E-05  2.92897777E-05  3.19162247E-05
 3.45147740E-05  3.70586415E-05  3.95315849E-05  4.19141478E-05  4.41859359E-05  4.63259205E-05  4.83127628E-05  5.01251591E-05
 5.17421718E-05  5.31436241E-05  5.43104104E-05  5.52240575E-05  5.58710456E-05  5.62351093E-05  5.63055094E-05  5.60757750E-05
 5.55322007E-05  5.46784223E-05  5.35111401E-05  5.20332638E-05  5.02308063E-05  4.81726231E-05  4.58113112E-05  4.31800554E-05
 4.02975279E-05  3.71753308E-05  3.38157426E-05  3.01821851E-05  2.61876835E-05  2.17917170E-05  1.71191955E-05  1.22031592E-05
 7.62658877E-06  2.94642990E-06 -1.63240829E-06 -6.03410803E-06 -1.01525557E-05 -1.39220403E-05 -1.72434029E-05 -2.01096444E-05
-2.25664011E-05 -2.47092559E-05 -2.66472825E-05 -2.84634561E-05 -3.01727397E-05  [illegible] -3.33?71856E-05 -3.47?36933E-05
-3.58652103E-05 -3.67819510E-05 -3.74396035E-05 -3.78332241E-05 -3.79676515E-05  [illegible] -3.74672319E-05 -3.68362436E-05
-3.60638517E-05 -3.50347286E-05 -3.38131017E-05 -3.24266056E-05 -3.08861329E-05 -2.92156794E-05 -2.74?21071E-05  [illegible]
-2.36476226E-05 -2.16837151E-05 -1.97057687E-05
```

1	1	92					
9.69141693E-06	1.10641754E-05	1.25426985E-05	1.40324075E-05	1.55275474E-05	1.70212128E-05	1.85054001E-05	
2.14083040E-05	2.28063068E-05	2.41536636E-05	2.54384362E-05	2.66640541E-05	2.77709940E-05	2.87934781E-05	
3.04929864E-05	3.11461095E-05	3.16546197E-05	3.20092620E-05	3.22320738E-05	3.22264356E-05	3.20772577E-05	
3.12456013E-05	3.05609168E-05	2.96186509E-05	2.84623409E-05	2.74572911E-05	2.60905195E-05	2.45706134E-05	
2.11104914E-05	1.91864656E-05	1.71202409E-05	1.49218313E-05	1.25553695E-05	1.00777364E-05	7.55722351E-06	
5.88833307E-08	-2.33952946E-06	-4.63052654E-06	-6.77694212E-06	-8.75029408E-06	-1.05387170E-05		
-1.49469543E-05	-1.61822409E-05	-1.73232899E-05	-1.83605295E-05	-1.92911756E-05	-2.01037709E-05		
-2.16492838E-05	-2.19497313E-05	-2.18941135E-05	-2.17803372E-05	-2.15304946E-05	-2.11321242E-05		
-1.91602278E-05	-1.82744126E-05	-1.72914016E-05	-1.62222704E-05	-1.50790010E-05	-1.38733969E-05		
-1.13254918E-05	-1.00087348E-05						

48	18	92					
4.35109900E-06	4.99028422E-06	5.63748511E-06	6.29052738E-06	6.94672573E-06	7.60289563E-06	8.25537562E-06	
9.53244227E-06	1.01476670E-05	1.07405923E-05	1.13058593E-05	1.18379685E-05	1.23313623E-05	1.27805114E-05	
1.35246307E-05	1.38094836E-05	1.40230319E-05	1.41822083E-05	1.42624848E-05	1.42679402E-05	1.41963203E-05	
1.38164253E-05	1.35073008E-05	1.31195170E-05	1.26546774E-05	1.21151751E-05	1.15041708E-05	1.08255464E-05	
9.28382228E-06	8.49014818E-06	7.52545344E-06	6.56570602E-06	5.56588978E-06	4.52721306E-06	3.47106851E-06	
1.35066322E-06	3.03034550E-07	-7.23386575E-07	-1.71636475E-06	-2.68870588E-06	-3.56188071E-06	-4.39907940E-06	
-5.89323533E-06	-6.55480584E-06	-7.16213761E-06	-7.71460080E-06	-8.20870675E-06	-8.64262389E-06	-9.01321822E-06	
-9.54617548E-06	-9.70555588E-06	-9.79350000E-06	-9.81121730E-06	-9.76047169E-06	-9.64333398E-06	-9.46241110E-06	
-9.92236803E-06	-8.57080605E-06	-8.17042583E-06	-7.72577977E-06	-7.24164595E-06	-6.72300485E-06	-6.17500107E-06	
-5.01207702E-06	-4.40792657E-06						

49	18	92					
1.07424183E-06	1.23030774E-06	1.38840654E-06	1.54799160E-06	1.70839205E-06	1.86881562E-06	2.02835408E-06	
2.34361348E-06	2.49102271E-06	2.63595144E-06	2.77407989E-06	2.90405478E-06	3.02450948E-06	3.13408518E-06	
3.31533411E-06	3.38452515E-06	3.43791560E-06	3.47450967E-06	3.49344443E-06	3.49400658E-06	3.47564701E-06	
3.38085541E-06	3.30423791E-06	3.20834237E-06	3.09356753E-06	2.96050656E-06	2.80994175E-06	2.64283569E-06	
2.26365674E-06	2.05421321E-06	1.83322881E-06	1.60226588E-06	1.36233193E-06	1.11479257E-06	8.65996462E-07	
3.61601025E-07	1.11348129E-07	-1.34959579E-07	-3.75296092E-07	-6.07705051E-07	-8.30408301E-07	-1.04190914E-06	
-1.42694832E-06	-1.59892861E-06	-1.75633596E-06	-1.89848918E-06	-2.02465235E-06	-2.13430470E-06	-2.22695449E-06	
-2.35961899E-06	-2.39941531E-06	-2.42168921E-06	-2.42676690E-06	-2.41510464E-06	-2.38726820E-06	-2.34394046E-06	
-2.21409146E-06	-2.12943850E-06	-2.03301206E-06	-1.92593191E-06	-1.80937474E-06	-1.68456445E-06	-1.55276255E-06	
-1.27336024E-06	-1.12838483E-06						

VELOCITY POTENTIAL AT GRID POINTS
1 GENERAL POINTS
2 POINTS UNDER WING

1	18	92					
-5.32944092E-04	-6.05320984E-04	-6.90701840E-04	-7.91801636E-04	-9.12234332E-04	-1.05695335E-03	-1.23300240E-03	
-1.72734268E-03	-2.09163693E-03	-2.60298876E-03	-3.41042503E-03	-4.97678048E-03	-6.64036007E-03	-8.24606945E-03	
-1.10543719E-02	-1.22039658E-02	-1.31665511E-02	-1.39263664E-02	-1.45111596E-02	-1.48911977E-02	-1.50785759E-02	
-1.44899275E-02	-1.45225763E-02	-1.39805325E-02	-1.32772140E-02	-1.24229441E-02	-1.14281448E-02	-1.02941018E-02	
-7.68279103E-03	-6.27675439E-03	-4.88074597E-03	-3.56458082E-03	-2.42367283E-03	-1.07158891E-03	2.89794655E-04	
3.51086141E-03	5.34983114E-03	7.29795931E-03	9.32171893E-03	1.13913202E-02	1.34800724E-02	1.55621025E-02	
1.95764109E-02	2.13649598E-02	2.06663947E-02	1.88342189E-02	1.73208925E-02	1.59328810E-02	1.45552530E-02	
1.16436317E-02	1.00602654E-02	8.39303090E-03	6.66759003E-03	4.93911046E-03	3.34508381E-03	2.53320207E-03	
1.69096106E-03	1.43548500E-03	1.23623548E-03	1.07559678E-03	9.43118822E-04	8.32153177E-04	7.38206881E-04	
5.89427528E-04	5.30420018E-04						

1	1	39					
-1.50763840E-02	-1.48764077E-02	-1.44863663F-02	-1.39435246E-02	-1.32423775F-02	-1.23871196E-02	-1.13951839E-02	
-8.96812603E-03	-7.60777988E-03	-6.17075451E-03	-4.74733253E-03	-3.46286926E-03	-2.18311382E-03	-7.45073570E-04	
2.48798911E-03	4.26335656E-03	6.05319852E-03	7.88180467E-03	9.69792306E-03	1.15101259E-02	1.32755409E-02	
1.66893045E-02	1.66811281E-02	1.66411281E-02	1.59993499E-02	1.47597186E-02	1.30980119E-02		
1.03027417E-02	8.80896270E-03	7.22539640E-03	5.55616187E-03	3.83268100E-03	2.10424142E-03		

2	18	92					
-5.32655433E-04	-6.04953525E-04	-6.90225992E-04	-7.91172440E-04	-9.11380367E-04	-1.05575468E-03	-1.23124257E-03	
-1.72261835F-03	-2.08218573E-03	-2.57827963E-03	-3.31305671F-03	-4.44398286F-03	-5.67924688E-03	-6.90157248E-03	
-9.09866570E-03	-1.00198062E-02	-1.08030872E-02	-1.14405570E-02	-1.19276123E-02	-1.22620775E-02	-1.24435512E-02	
-1.23473584E-02	-1.20746242E-02	-1.16605327E-02	-1.11115617E-02	-1.04353396E-02	-9.64044653E-03	-8.72358740E-03	
-6.59360766E-03	-5.44274355E-03	-4.30830824E-03	-3.26538669E-03	-2.30409728E-03	-1.32516802E-03	-2.27316704E-04	
4.05740114E-03	5.75996916E-03	7.55336136E-03	9.41157823E-03	1.13111567E-02	1.32291714E-02		
1.70023262E-02	1.87075522E-02	1.79283440E-02	1.61626926E-02	1.47196951E-02	1.34178312E-02	1.21776245E-02	
9.67795301E-03	8.37395473E-03	7.03836956E-03	5.69715389E-03	4.39950725E-03	3.24358095E-03	2.07049111E-03	
1.68629669E-03	1.47288889E-03	1.23462853E-03	1.07452050E-03	9.42354521E-04	8.31586267E-04	7.37772395E-04	
5.30197250E-04							

2	1	39					
-1.23473584E-02	-1.20533996E-02	-1.16377796E-02	-1.10899977E-02	-1.04147889E-02	-9.61918678E-03		
-7.64521035E-03	-6.53365461E-03	-5.35824108E-03	-4.20491966E-03	-3.17163988E-03	-2.18210887E-03	-1.01934327E-03	
1.67716382E-03	3.19295087E-03	4.73433437E-03	6.32952440E-03	7.97566419E-03	9.52838605E-03	1.11234533E-02	
1.41650549E-02	1.42822061E-02	1.40365343E-02	1.34288758E-02	1.24597705E-02	1.14218017E-02		
8.68219508E-03	7.41802836E-03	6.11403008E-03	4.77844491E-03	3.42722924E-03	2.13958260E-03		

3	18	92					
-5.32103916E-04	-6.04251694E-04	-6.89317576E-04	-7.89972082E-04	-9.09752840E-04	-1.05347382E-03	-1.22790311E-03	
-1.71380649E-03	-2.08514335E-03	-2.58341802E-03	-3.19852862E-03	-4.10026915E-03	-5.09247232E-03	-6.08933115E-03	
-7.91760485E-03	-8.69842462E-03	-9.37043188E-03	-9.92474813E-03	-1.03556071E-02	-1.06595325E-02	-1.08347429E-02	
-1.07933959E-02	-1.05729973E-02	-1.02219142E-02	-9.77652163E-03	-9.20815677E-03	-8.53415009E-03	-7.77769488E-03	
-5.91025292E-03	-4.91110629E-03	-3.93115011E-03	-2.95222067E-03	-1.97271944E-03	-1.45625443E-03	-5.08859489E-04	
1.87901281E-03	3.79787869E-03	4.83916108E-03	6.47938616E-03	8.19608951E-03	9.96857384E-03	1.17764455E-02	
1.53812194E-02	1.70210298E-02	1.62230776E-02	1.44754919E-02	1.30944170E-02	1.18655714E-02	1.07137422E-02	
8.47931789E-03	7.34532315E-03	6.23079694E-03	5.09480279E-03	4.04444844E-03	3.12244359E-03	2.44468730E-03	
1.87763088E-03	1.42799677E-03	1.23158225E-03	1.07247352E-03	9.40396100E-04	8.30504697E-04	7.38942231E-04	
5.88631013E-04	5.29771435E-04						

3	1	39					
0.	0.	0.	-1.05729973E-02	-1.02319142E-02	-9.77652163E-03	-9.20815677E-03	-8.53415009E-03
-7.71764071E-03	-6.83462345E-03	-5.87556655E-03	-4.86228182E-03	-3.87562361E-03	-2.91638668E-03	-2.18085627E-03	-1.18691239E-03
1.17658095E-03	2.53616476E-03	3.92545421E-03	5.37754710E-03	6.83965050E-03	8.33130800E-03	9.80542456E-03	
1.21538307E-02	1.21542370E-02	1.26370582E-02	1.27220638E-02	1.24616491E-02	1.18470722E-02	1.10599503E-02	1.00943749E-02
8.68430956E-03	7.55586289E-03	6.44453121E-03	5.31083647E-03	4.17431025E-03	3.06091611E-03	2.01006196E-03	

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-5.85657474E-04	1.19827515E-03	6.97841074E-04	1.81674628E-03	2.71238615E-03	3.68352963E-03	4.71983928E-03	5.81042342E-03
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4.45404176E-03	3.85796600E-03	3.28015782E-03	2.83176834E-03	2.19807706E-03	2.25809412E-03	2.06940642E-03	1.85181486E-03
1.64091428E-03	1.44882920E-03	1.27737176E-03	1.12792025E-03	9.98131664E-04	8.85700965E-04	7.88337654E-04	7.03974167E-04
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13 18 92

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4.16845185E-03	3.67454656E-03	3.15111292E-03	2.68672626E-03	2.26529465E-03	2.16580356E-03	1.98568273E-03	1.78611499E-03
1.59139903E-03	1.41148508E-03	1.24999601E-03	1.10736507E-03	9.82477014E-04	8.73987169E-04	7.78814782E-04	6.96377376E-04
6.24682000E-04	5.62345194E-04	5.08181125E-04					

14 18 92

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6.33066421E-03	6.83736406E-03	6.57644123E-03	6.16176855E-03	5.71719503E-03	5.16943364E-03	4.72738142E-03	4.32003639E-03
3.90559230E-03	3.47298540E-03	3.02723181E-03	2.60251851E-03	2.27403844E-03	2.09306624E-03	1.91039969E-03	1.72310209E-03
1.54133189E-03	1.37344826E-03	1.22085145E-03	1.08501175E-03	9.65173853E-04	8.60033226E-04	7.68052466E-04	6.87741450E-04
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15	18	92							
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16	18	92							
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-2.65232992E-03	-2.85431223E-03	-3.04498648E-03	-3.22018265E-03	-3.37604858E-03	-3.50907974E-03	-3.61613019E-03	-3.69441384E-03		
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4.70644000E-03	5.31573069E-03	5.13539459E-03	4.91542430E-03	4.67396755E-03	4.57842834E-03	4.20893687E-03	3.82171155E-03		
3.44136891E-03	3.07135150E-03	2.71739525E-03	2.39490721E-03	2.12914661E-03	1.94852735E-03	1.77096740E-03	1.60173488E-03		
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18	18	92							
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-3.19846194E-03	-3.21102896E-03	-3.19495590E-03	-3.14897044E-03	-3.07213211E-03	-2.96388036E-03	-2.82413736E-03	-2.65352593E-03		
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1.33873779E-03	1.20742543E-03	1.08697048E-03	9.77458081E-04	8.78684591E-04	7.90179891E-04	7.11291059E-04	6.41268952E-04		
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19	18	92							
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-2.94828736E-03	-2.95987813E-03	-2.94566944E-03	-2.90446660E-03	-2.83538497E-03	-2.73790845E-03	-2.61200822E-03	-2.45839421E-03		
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1.28514303E-03	1.16203847E-03	1.04897348E-03	9.45869491E-04	8.52506909E-04	7.68490955E-04	6.93286415E-04	6.26271835E-04		
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-9.66635821E-04	-1.07556887E-03	-1.19284234E-03	-1.31758730E-03	-1.44852143E-03	-1.58396815E-03	-1.72191246E-03	-1.86008147E-03		
-1.99603386E-03	-2.12724479E-03	-2.25117881E-03	-2.36534828E-03	-2.46735795E-03	-2.55493844E-03	-2.62597118E-03	-2.67850791E-03		
-2.71078729E-03	-2.72125342E-03	-2.70855088E-03	-2.67157447E-03	-2.60950862E-03	-2.52189377E-03	-2.40875414E-03	-2.27085341E-03		
-2.11033320E-03	-1.93157465E-03	-1.74272253E-03	-1.55425705E-03	-1.37056607E-03	-1.18173916E-03	-9.71521630E-04	-7.72420976E-04		
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1.22973030E-03	1.11475641E-03	1.00900044E-03	9.12289060E-04	8.24394699E-04	7.44980642E-04	6.73607498E-04	6.09761558E-04		
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21	18	92							
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-9.19623327E-04	-1.01549265E-03	-1.12640090E-03	-1.23952535E-03	-1.35771257E-03	-1.47949600E-03	-1.60313807E-03	-1.72668956E-03		
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-2.48504843E-03	-2.49429431E-03	-2.48280832E-03	-2.44958170E-03	-2.39387647E-03	-2.31529569E-03	-2.21391211E-03	-2.09050784E-03		
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-4.10113322E-04	-1.10593367E-04	2.30479718E-04	6.13711145E-04	1.04020693E-03	1.50857836E-03	2.01256880E-03	2.53125423E-03		
2.96217697E-03	3.09081876E-03	3.10894039E-03	3.06461416E-03	2.97654892E-03	2.86095230E-03	2.71612605E-03	2.55232354E-03		
2.37758144E-03	2.19993560E-03	2.02235698E-03	1.85282134E-03	1.69396797E-03	1.54742540E-03	1.41245514E-03	1.28773156E-03		
1.17224582E-03	1.06542062E-03	9.66955269E-04	8.76864991E-04	7.94286834E-04	7.19583764E-04	6.52180768E-04	5.91657903E-04		
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22	18	92							
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-2.27031889E-03	-2.27929715E-03	-2.26779810E-03	-2.23791363E-03	-2.18798739E-03	-2.11768524E-03	-2.02711729E-03	-1.91704758E-03		
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-7.47442615E-07 -7.24909239E-07 -7.03160804E-07 -6.82320487E-07 -6.62500580E-07 -6.43801867E-07 -6.26313103E-07 -6.10110596E-07
-5.95257870E-07 -5.81805443E-07 -5.69790683E-07

AXIAL LIFT DISTRIBUTION
CP(J) = LIFT MINUS VORTEX EFFECT
CP0(J) = LIFT
CP1(J) = LIFT MINUS THICKNESS AND VORTEX EFFECTS
CP2(J) = LIFT MINUS THICKNESS EFFECT
AINT = THICKNESS EFFECT
DCP = VORTEX EFFECT

J	CP(J)	CP0(J)	CP1(J)	CP2(J)	AINT	DCP
43	1.59C75137E-02	2.02903233E-03	1.64586993E-03	2.08415185E-03	-5.51185559E-05	4.38281927E-04
44	1.66216973E-03	2.52146043E-03	1.71226571E-03	2.5715564CE-03	-5.00959766E-05	8.59293698E-04
45	1.86044597E-03	3.13462525E-03	1.85855261E-03	3.13273190E-03	1.89335472E-06	1.27417928E-03
46	2.08522324E-03	3.76580582E-03	2.08182789E-03	3.76241047E-03	3.39535429E-06	1.66038258E-03
47	2.36321853E-03	4.46054401E-03	2.38003337E-03	4.45735865E-03	3.18516686E-06	2.07732548E-03
48	2.68545377E-03	5.14868276E-03	2.75452721E-03	5.21775620E-03	-6.90734347E-05	2.46322899E-03
49	3.11334709E-03	5.95316506E-03	3.22086844E-03	6.06068649E-03	-1.07521435E-04	2.83981805E-03
50	3.81175624E-03	7.03064482E-03	3.84667711E-03	7.06555969E-03	-3.49148698E-05	3.21688658E-03
51	4.75612294E-03	8.40092314E-03	4.86212750E-03	8.50692770E-03	-1.06004564E-04	3.64480020E-03
52	6.73351424E-03	1.09866219E-02	6.84005543E-03	1.11431631E-02	-1.56541189E-04	4.25310766E-03
53	1.11331674E-02	1.64793419E-02	1.11074836E-02	1.64536380E-02	2.57038601E-05	5.34617446E-03
54	1.84369966E-02	2.55800859E-02	1.85465086E-02	2.56895975E-02	-1.09511959E-04	7.14308889E-03
55	2.73699157E-02	3.65005685E-02	2.84229909E-02	3.75532437E-02	-1.05267528E-03	9.13065281E-03
56	3.65218752E-02	4.71224304E-02	3.83478225E-02	4.89384277E-02	-1.81594733E-03	1.05906052E-02
57	4.50059503E-02	5.64408913E-02	4.68259023E-02	5.83008438E-02	-1.81995201E-03	1.14749415E-02
58	5.20181364E-02	6.40749104E-02	5.38377024E-02	6.58944764E-02	-1.81956603E-03	1.20567740E-02
59	5.90140439E-02	7.15426963E-02	5.97327429E-02	7.22613954E-02	-7.13698989E-04	1.42286526E-02
60	6.52024262E-02	7.81629749E-02	6.46245117E-02	7.75850604E-02	5.77914497E-04	1.29605487E-02
61	6.99703925E-02	8.33209584E-02	6.83687106E-02	8.17252765E-02	1.60168190E-03	1.23515658E-02
62	7.35651288E-02	8.72606787E-02	7.06741500E-02	8.43696580E-02	2.89097874E-03	1.36955079E-02
63	7.53160870E-02	8.92667629E-02	7.12088792E-02	8.51595551E-02	4.10720763E-03	1.39506759E-02
64	7.59250418E-02	9.00258095E-02	6.97060888E-02	8.38063565E-02	6.21895301E-03	1.41007676E-02
65	7.83439379E-02	9.24818025E-02	6.60742243E-02	8.02120926E-02	1.22697135E-02	1.41378683E-02
66	8.25183911E-02	9.68912591E-02	6.04849744E-02	7.45578424E-02	2.21334167E-02	1.40728680E-02
67	8.29429440E-02	9.67789029E-02	5.33953470E-02	6.73313059E-02	2.94475970E-02	1.39359589E-02
68	5.39691129E-02	6.77392259E-02	4.54756630E-02	5.92458760E-02	8.49344986E-03	1.37702129E-02
69	1.88059147E-02	3.22251203E-02	3.74607627E-02	5.10799679E-02	-1.88548460E-02	1.36192053E-02
70	1.30390093E-02	2.65224203E-02	2.99953706E-02	4.34987855E-02	-1.40763653E-02	1.35134149E-02
71	9.79156541E-03	2.32533795E-02	1.75359970E-02	3.09978111E-02	-7.74443162E-03	1.34611141E-02
72	8.01824998E-03	2.14710194E-02	1.18583260E-02	2.53110954E-02	-3.84307599E-03	1.34527694E-02
73	6.11794019E-03	1.95811043E-02	7.88866401E-03	2.13518278E-02	-1.77072383E-03	1.34631638E-02
74	4.28968382E-03	1.77599138E-02	5.14689755E-03	1.86171275E-02	-8.57213735E-04	1.34702300E-02
75	3.27645013E-03	1.67366243E-02	3.25250063E-03	1.67126747E-02	2.39495434E-05	1.34601741E-02
76	6.54295037E-03	1.99743624E-02	1.92374173E-03	1.53546537E-02	4.62020863E-03	1.34309120E-02
77	4.96242703E-03	1.83924043E-02	9.58895499E-04	1.43488719E-02	4.00353243E-03	1.33894764E-02
78	-1.47868519E-04	1.32024831E-02	0.	1.33503517E-02	-1.47868519E-04	1.33503517E-02

LIFT AND MOMENT
AL = LIFT, AM = MOMENT, XBAR = MOMENT ARM ABOUT NOSE
A = ATTACHED FLOW, S = SEPARATED FLOW
NS = NEGLECT SHOCK
AINTO = SHOCK LIFT , SMA = VORTEX LIFT
AREA = EXPOSED WING AREA
OR MAXIMUM CROSS-SECTIONAL AREA

ALA = 2.01012025E-02

ALS = 2.69564257E-02

AMA = 1.31611109E-02

AMS = 1.79579237E-02

XBARA = 6.54742466E-01

XBARS = 6.66183315E-01

ALANS = 1.93366004E-02

ALSNS = 2.61918276E-02

AMANS = 1.26295870E-02

AMSNS = 1.74263998E-02

XBARAN = 6.53144129E-01

XBARSN = 6.65337258E-01

AINTO = 7.64602085E-04

SMA = 6.85522716E-03

CLA = 2.67213459E-01

CLS = 3.58345463E-01

CLANS = 2.57051216E-01

CLSNS = 3.48181221E-01

CAINTO = 1.01642425E-02

CSMA = 9.11300049E-02

CMA = 1.74957309E-01

CMS = 2.38723769E-01

CMANS = 1.67891493E-01

CMSNS = 2.31657553E-01

AREA = 1.50449358E-01

BODY SURFACE PRESSURE COEFFICIENTS
CP(J) - OMEGA = +0 DEGREES (LEEWARD SIDE)
CP0(J) - OMEGA = -0 DEGREES (WINDWARD SIDE)
CP1(J) - OMEGA = +90 DEGREES
CP2(J) - OMEGA = -90 DEGREES
CPX,CP0X,CP1X AND CP2X - VORTEX EFFECTS NEGLECTED

J	CP(J)	CP0(J)	CP1(J)	CP2(J)	CPX	CP0X	CP1X	CP2X
31	2.26606185E-01	2.26606185E-01	1.92497076E-01	2.99643020E-01				
32	1.75244456E-01	1.75244456E-01	1.43367554E-01	2.46049083E-01				
33	1.40261819E-01	1.40261819E-01	1.10617124E-01	2.08834239E-01				
34	1.12209724E-01	1.12209724E-01	8.47972359E-02	1.78549537E-01				
35	8.81945923E-02	8.81945923E-02	6.30143116E-02	1.52302598E-01				
36	6.68998221E-02	6.68998221E-02	4.39518186E-02	1.28775691E-01				
37	4.76013062E-02	4.76013062E-02	2.68854398E-02	1.07244898E-01				
38	2.98527703E-02	2.98527703E-02	1.13691111E-02	8.72641546E-02				
39	1.33577364E-02	1.33577364E-02	-2.89371569E-03	6.85369134E-02				
40	-2.09523192E-03	-2.09523192E-03	-1.61144768E-02	5.08517380E-02				
41	-1.66849798E-02	-1.66849798E-02	-2.84720176E-02	3.40297829E-02				
42	-3.04970674E-02	-3.04970674E-02	-4.00518580E-02	1.79854802E-02				
43	-9.63728447E-02	-7.03029011E-04	-5.40659462E-02	1.32736441E-02	-5.17006006E-02	9.67617788E-03	-5.22028499E-02	1.03784272E-02
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48	-1.42707767E-01	-6.06380693E-02	-1.12773837E-01	-5.73081769E-02	-1.11724123E-01	-4.66961253E-02	-1.03081814E-01	-5.53404343E-02
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71	1.19392797E-01	1.26605577E-01	1.26605577E-01	1.19392797E-01				
72	1.11850259E-01	1.31770934E-01	1.18771515E-01	1.25051016E-01				
73	1.12256659E-01	1.18782004E-01	1.18782004E-01	1.12256659E-01				
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76	1.44812958E-01	1.52927432E-01	1.52927432E-01	1.44812958E-01				
77	1.70287627E-01	1.73987891E-01	1.73987891E-01	1.70287627E-01				
78	2.00324518E-01	2.02956421E-01	2.02956421E-01	2.00324518E-01				
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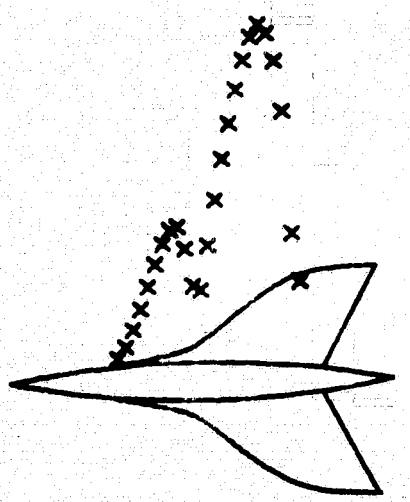

SONIC LINE AND SHOCK WAVE
M = .980 F =10.000 H = .300
ALPHA = 4.00 DEG. OMEGA = 0.00 DEG.

Figure 7.- Outline of configuration and shock-wave and sonic-line locations in computational plane.

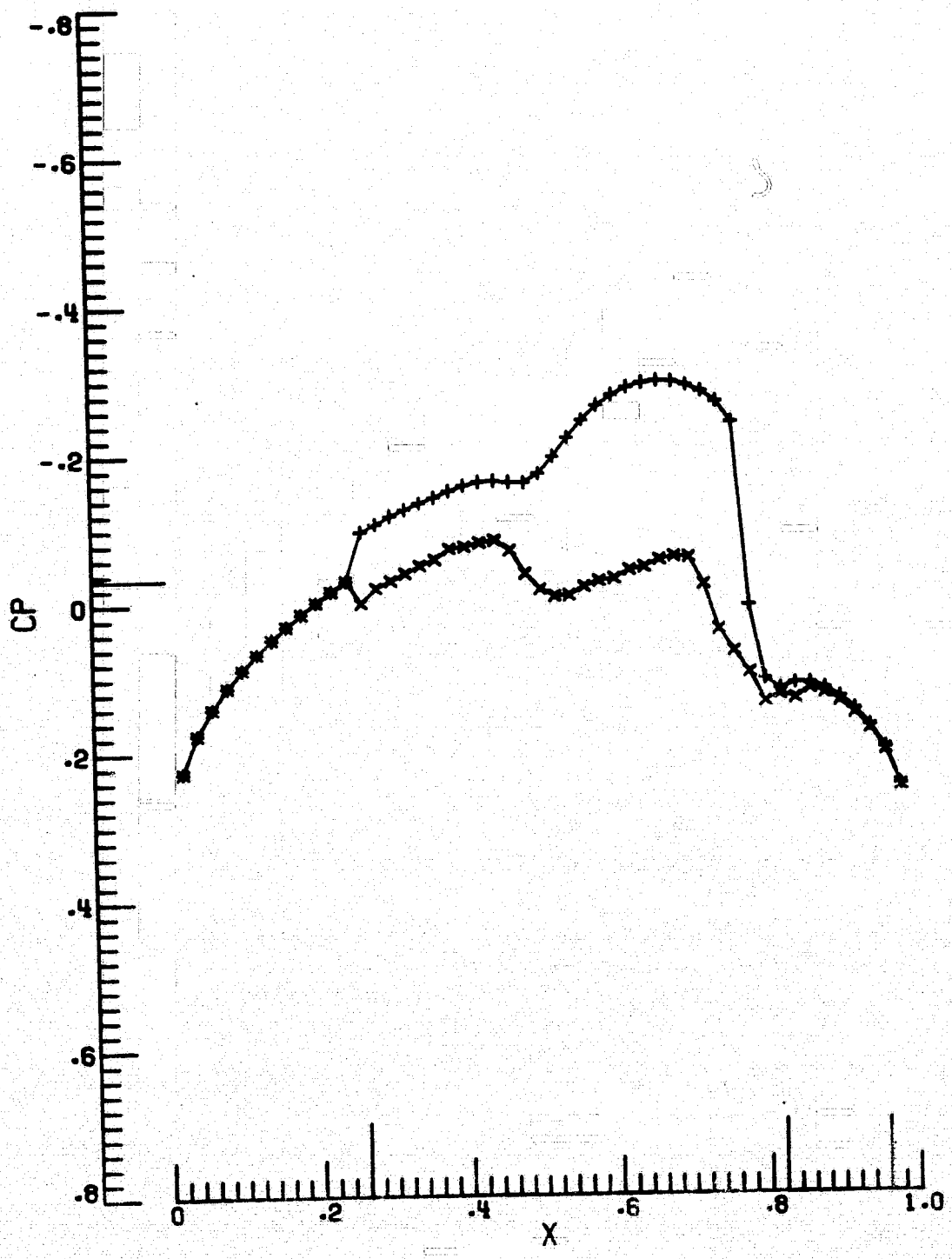

Figure 8.- Body pressure distribution in wing plane.

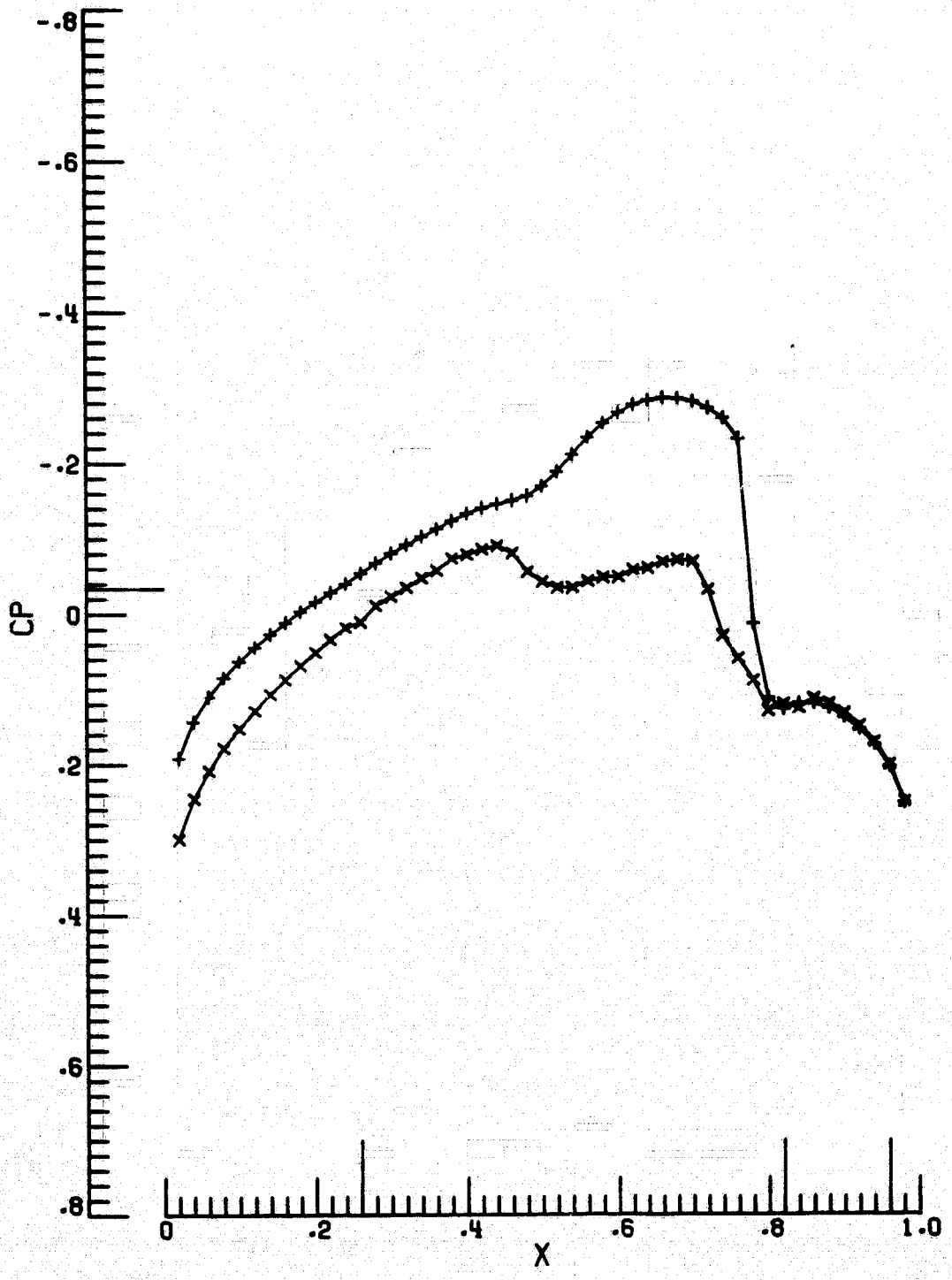

Figure 9.- Body pressure distribution in symmetry plane.

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