

CR 137550

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April 1974

Flow Research Report No. 32
A Viscous/Potential Flow Interaction
Analysis Method for Multi-Element
Infinite Swept Wings

Volume II

By

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Prepared under Contract No. NAS2-7048

By

Flow Research, Inc.
Kent, Washington 98031

for

Ames Research Center
National Aeronautics and Space Administration

(NASA-CR-137550) A VISCOUS POTENTIAL
FLOW INTERACTION ANALYSIS METHOD FOR
MULTI-ELEMENT INFINITE SWEPT WINGS, VOLUME
2 (Flow Research, Inc., Kent, Wash.)
126 p HC \$9.50

N74-32413

C5CL 01A

G3/01

Unclas
48296

TABLE OF CONTENTS

	Page
APPENDIX IV PROGRAM INPUT DESCRIPTION	89
APPENDIX V PROGRAM OUTPUT DESCRIPTION	94
APPENDIX VI PROGRAM LISTING	114

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APPENDIX IV
PROGRAM INPUT DESCRIPTION

DATA CARDS

<u>Card Set</u>	<u>Input</u>	<u>Format</u>
1.	Case Title	8A10
2.	XXFIND, XPHIL, TOLL1, TOLL2, XSOLVE, XGEM	7F10.0
3.	XFIND(1), XFIND(2) - - - XFIND(NXFIND)	7F10.0
4.	RNB, TRIPUP, OPTION, SANGLE, TRMAX, REFC, UIN	7F10.0
5.	XPRINT, XSKIP, REFX, REFZ, CREF, PRINT, CASE	7F10.0
6.	NCMPT, NSLAT, NFLAP, NPU(1), NPL (1), NPU(NCMPT), NPL(NCMPT)	14I5
7.	XU(1) , XU(2) - - - XU(NPU(1)) ZU(1) , ZU(2) - - - ZU(NPU(1)) XL(1) , XL(2) - - - XL(NPL(1)) ZL(1) , ZL(2) - - - ZL(NPL(1)) ; ; ; XU(1) , XU(2) - - - XU(NPU(NCMPT)) ZU(1) , ZU(2) - - - ZU(NPU(NCMPT)) XL(1) , XL(2) - - - XL(NPL(NCMPT)) ZL(1) , ZL(2) - - - ZL(NPL(NCMPT))	7F10.0 7F10.0
8.	XPW(1) , ZPW(1) - - - XPW(NCMPT-1), ZPW(NCMPT-1)	7F10.0
9.	XPC(1) , ZPC(1) - - - XPC(NCMPT-1), ZPC(NCMPT-1)	7F10.0
10.	DELF(1) , - - - DELF(NCMPT-1)	7F10.0
11.	SIGMA	7F10.0
12.	MACH, ALPHA	7F10.0
13.	DX, DXMAX, Z, TRIP	7F10.0
14.	-1.	7F10.0
15.	6/7/8/9	

The input to Program VIP is described in the following section.

CARD 1:

Title card, all 80 characters may be used.

CARD 2:

Field 1-10: XXFIND, Number of print locations on flap upper surface.
If XXFIND = 0. CARD 3 is not required.

Field 11-20: XPHIL, Iteration number on which flap boundary layer
velocity distributions are printed.

Field 21--30: TOLL1, Convergence criterion tolerance on Lift coefficient, .005 < TOLL1 < .015.

Field 31-40: TOLL2, Convergence criterion tolerance for iterative matrix inversion method, TOLL2 = .01.

Field 41-50: XSOLVE, Specifies matrix solution technique, XSOLVE = 0., direct; XSOLVE = 1., iterative.

Field 51-60: XGEM, Geometry printout option, if XGEM = 0., a complete calculation is performed; if XGEM = 1., only the lofted geometry is printed and the calculation is terminated.

CARD 3:

XFIND(1), XFIND(2) etc, X coordinates of print stations for flap velocity distributions, input in flap coordinates. This card not required if XXFIND = 0.

CARD 4:

Field 1-10: RNB, Reynolds number based on Reference Chord and Free stream velocity $U_{\infty} C/v \times (10^{-6})$.

Field 11 - 20: TRIPUP, Trip location (x/c), Currently if tripping is desired, each surface of each element will be tripped at the same location. If tripping is not desired TRIPUP = 1.

Field 21 - 30: OPTION, Trip option, OPTION = 1., This deters the user from specifying a trip location where the boundary layer could not (because of the Reynolds number) become turbulent. If too early a trip location is specified, the location is repositioned to correspond to the point where R_{θ} exceeds 200.

Field 31 - 40: SANGLE, Sweep angle in degrees.

Field 41 - 50: TRMAX, Maximum number of iterations between potential flow and boundary layer modules. The convergence criterion in the program will reset this parameter to a smaller number if for the particular angle-of-attack convergence is achieved.

Field 51 - 60: REFC, Reference chord in inches. This is required for determination of surface arc distances in INSPAN.

Field 61 - 70: UIN, Free stream velocity in feet per second. This is required in INSPAN.

CARD 5:

Field 1 - 10: XPRINT, Print option for swept case, prints cross-flow integral thicknesses from IBL.

XPRINT = 0. printing suppressed

XPRINT = 1. extra printing

Field 11 - 20: XSKIP, Print option for IBL, XSKIP = 1., every integration step is printed; XSKIP = 5. (usual value) every fifth step is printed.

Field 21 - 30: REFX, Reference (x/c) location for calculation of moment coefficient.

Field 31 - 40: REFZ, Reference (z/c) location for calculation of moment coefficient.

Field 41 - 50: CREF, Reference chord for aerodynamic force calculations. If geometry input in percent then CREF = 100. Normally CREF = 1.

Field 51 - 60: PRINT, Optional diagnostic printing for potential flow routines

PRINT = 0. printing suppressed,

PRINT = 1. extra printing.

Field 61 - 70: CASE, specifies number of angle of attack or Mach number variations for a given geometry. Number of CARD Sets 12 and 13 must be repeated to coincide with the value of CASE. If NFLAP = 0, then CARD sets 12 and 13 are not required.

CARD 6

Field 1-5: NCMPT, number of components in configuration (i.e., slat, main element, double slotted flap, NCMPT = 4). If NCMPT = 1, Card sets 8, 9, 10, 11, and 13 are not required.

Field 6-10: NSLAT, number of slats in configuration.

Field 11-15: NFLAP, number of slotted flaps, currently the maximum allowed is 2. If NFLAP = 0, then Card sets 11 and 13 are not required.

Field 16-20: NPU(1), number of x,z coordinates describing the upper surface of component one. (Limit = 30)

Field 21-25: NPL(1), number of x,z coordinates describing the lower surface of component one. (Limit = 30)

Note: If more than one element is being considered, then the parameters NPU, and NPL are specified for each element in turn in the remaining fields 26 - 70.

CARD SET 7:

- XU(1), XU(2) - - - etc., coordinates x/c of upper surface of element number one (NPU(1) points)
- ZU(1), ZU(2) - - - etc., coordinates z/c of upper surface of element number one (NPU(1) points)
- XL(1), XL(2) - - - etc., coordinates x/c of lower surface of element number one (NPL(1) points)
- ZL(1), ZL(2) - - - etc., coordinates z/c of lower surface of element number one (NPL(1) points).

NOTE: This card set is repeated to correspond to the input of elements two, three and four if present.

CARD 8:

XPW(1), ZPW(1) etc., X and Z coordinates of flap or slat pivot points in wing coordinates. Points listed in order, i.e., slat first. If NCMPT = 1, this card is not required.

CARD 9:

XPC(1), ZPC(1), etc., X and Z coordinates of flap or slat pivot points in component coordinates. If NCMPT = 1, this card is not required.

CARD 10:

DELF(1), etc., flap or slat rotation angles in degrees; clockwise positive. If NCMPT = 1, this card is not required.

CARD 11:

SIGMA, tension factor in splines under tension routines. Suggest SIGMA = -10. If NFLAP = 0, this card is not required.

CARD 12:

Field 1 - 10: MACH, free stream Mach number.

Field 11 - 20: ALPHA, angle-of-attack in degrees. If CASE > 1. then CARD 12 must be repeated the number of times specified by CASE.

CARD 13:

Field 1 - 10: DX, initial Δx step size for solution of partial differential equation in INSPAN. Suggest $\Delta x = .00015625$.

Field 11 - 20: DXMAX, maximum Δx step size allowed in INSPAN. Suggest DXMAX \leq .03.

Field 21 - 30: Z, Print parameter for velocity profile output in INSPAN. $25 \leq Z \leq 1000$, printout of first and last calculated profiles is a default option regardless of value of Z. If print option XPHIL is employed then Z should be set at 1500 to avoid excess printout.

Field 31 - 40: TRIP, trip location on flap upper surface (input option) TRIP specified in flap coordinates x/c.

NOTE: If NFLAP = 2, then CARD 13 must be repeated a second time to account for the second flap.

CARD 14:

Field 1 - 10: -1. Indicates end of data, program exits.

CARD 15:

6/7/8/9 card END-OF-JOB.

APPENDIX V

PROGRAM OUTPUT DESCRIPTION

A sample program output for an infinite swept wing calculation of a wing-slotted flap configuration is shown in the following pages. Briefly the output consists of the following in the order of its appearance:

- The configuration title followed by a summary table of the input and lofted geometry. If $NFLAP > 0$ the longitudinal radius of curvature for each flap upper surface is tabulated (R/C). This is followed by a summary of input conditions (Mach No., Angle of Attack, Sweep Angle, Iteration No.).
- The input airfoil geometry, calculated pressure coefficients and source strengths are tabulated for each surface of each component of the configuration.
- The incompressible boundary layer calculations for a particular surface are printed out, preceded by a summary giving the Reynolds No., Sweep Angle, Iteration No., and Surface. The printout includes the x/c coordinates, and arc length s/c which for a swept case is the streamwise distance measured from the stagnation point. The velocity U/U_∞ corresponds to the calculated s/c , as does the shape factor H , the boundary layer thickness δ , the momentum thickness θ , the angle β , the momentum thickness Reynolds No. R_θ , and the skin friction coefficient C_f in the resultant surface flow direction.
- If the turbulent boundary layer printout is preceded by a laminar boundary layer summary table, the table includes all of the parameters in the turbulent printout with the exception of the parameters δ , β , and R_θ , and includes the additional parameter du/ds , the pressure gradient.
- If optional printing of the integral cross-flow thicknesses is requested, the printout includes x/c , s/c , du/ds , the angle α , (the angle between the normal chord and the projection of the external streamline on the surface) the integral thicknesses δ_2^* , θ_{12} , θ_{21} and θ_{22} , and the streamwise skin friction coefficient C_f .
- A summary table is printed at the end of each boundary layer printout, and includes the lift coefficient of the overall configuration, the skin friction drag, pressure drag and total profile drag of the particular surface, and the moment coefficient of the configuration. The boundary layer printout is repeated for successive surfaces.
- If $NFLAP > 0$, that portion of the integral boundary layer development in the slot region on the flap upper surface is also printed with the same format as for other component surfaces.

- The slot exit point, flap upper surface transition point and the flap boundary layer thickness s/c at the slot exit are displayed. The non-dimensional streamwise velocity profile U_s/U_∞ is also displayed for reference.
- The boundary layer development over the flap upper surface from the slot exit rearward is printed out at specified stations. The initial input to Program INSPAN is displayed as profile number one. The printout includes a summary list giving the current values of the arc length (x) measured from the stagnation point, as well as current values of the following parameters:

x step size Δx (DX)
 boundary layer thickness δ (DELTA)
 displacement thickness δ^* (DELS)
 momentum thickness θ (THETA)
 shape factor H
 velocity defect U_d (UD)
 local free stream velocity U
 friction velocity U_τ (UTAU)
 skin friction coefficient $C_f/2$ by three different calculations
 (CF2(1), CF2(2), CF2(3))
 iteration number for implicit solution of finite difference
 equations (ITR)
 profile number (PRF. NO.)
 longitudinal radius of curvature (R(3))

The tabulated parameters spanwise velocity W/W_e , chordwise velocity U/U_e , linearized velocity UP, velocity gradient DU/DY , normal velocity V, eddy viscosity, EDDY, pressure gradient, P-GRAD and inviscid velocity, U-INVISCID are printed out as functions of the distance normal to the surface y/c . For swept wing cases a second tabulation is also presented. This table includes the resultant velocity UR, the angle BETA, the streamwise velocity US and the cross-flow velocity WC.

Other parameters also displayed include the surface value of angle β (CBETA), the skin friction components CFR in the resultant surface flow direction, CFS in the streamwise direction and CFC in the cross flow direction. Also printed out are the streamwise values of the shape factor H, the displacement thickness δ^* and the momentum thickness θ .

NOTE: The values of H, δ^* and θ displayed as part of the main summary table preceding the velocity profile printout are for the inner part of the velocity profile to U_{max} . These values are used in the calculation of the eddy viscosity profile.

Finally, for the last profile on the flap surface the values of H , δ^* and θ are given as are values of the lift and drag coefficients.

The printing procedure is repeated for each iteration with the exception that the integral boundary layer tables are deleted until the final iteration. At the end of the calculation a brief table summarizes the lift drag and moment coefficients as functions of the iteration number.

REPRODUCIBILITY OF THE
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***** RAE2215(FOSTFR) DROOPED LEADING EDGE-30 DEG FLAP *****

AIRFOIL GEOMETRY

COMPONENT = 1

UPPER SURFACE COORDINATES

INPUT		LOFTED	
X-IN	Z-IN	X-OUT	Z-OUT
-.00599	-.02224	-.00599	-.02224
-.00398	-.01758	-.00398	-.01758
-.00157	-.01385	-.00157	-.01385
.00216	-.00959	.00216	-.00959
.00599	-.00608	.00599	-.00608
.00972	-.00307	.00972	-.00307
.01883	.00307	.01883	.00307
.02793	.00981	.02793	.00981
.03716	.01385	.03716	.01385
.05585	.02319	.05585	.02319
.07469	.03175	.07469	.03175
.09357	.03933	.09357	.03933
.11270	.04635	.11270	.04635
.12120	.04911	.12120	.04911
.12984	.05000	.12984	.05000
.15018	.05483	.15018	.05483
.17023	.05775	.17023	.05775
.21027	.06261	.21027	.06261
.25023	.06647	.25023	.06647
.32980	.07113	.32980	.07113
.37006	.07203	.37006	.07203
.44982	.07128	.44982	.07128

.48983	.06958	.48983	.06958
.56924	.06439	.56924	.06439
.62706	.05922	.62706	.05922
.74952	.04439	.74952	.04439
.78939	.03857	.78939	.03857
.82473	.03325	.82473	.03325
.85820	.02783	.85820	.02783
.87004	.02582	.87004	.02582

LOWER SURFACE COORDINATES

INPUT

LOFTED

X-IN	Z-IN	X-OUT	Z-OUT
-.00599	-.02224	-.00599	-.02224
-.00422	-.03142	-.00422	-.03142
-.00038	-.03483	-.00038	-.03483
.00412	-.03722	.00412	-.03722
.00886	-.03901	.00886	-.03901
.01340	-.04019	.01340	-.04019
.01842	-.04129	.01842	-.04129
.02708	-.04278	.02708	-.04278
.03746	-.04418	.03746	-.04418
.04809	-.04532	.04809	-.04532
.08880	-.04789	.08880	-.04789
.12982	-.04882	.12982	-.04882
.16995	-.05201	.16995	-.05201
.21000	-.05742	.21000	-.05742
.24986	-.06182	.24986	-.06182
.28986	-.06486	.28986	-.06486
.36992	-.06774	.36992	-.06774
.40998	-.06756	.40998	-.06756

.49016	-.06251	.49016	-.06251
.53029	-.05835	.53029	-.05835
.59296	-.05028	.59296	-.05028
.60978	-.02750	.60978	-.02750
.62852	-.01071	.62852	-.01071
.65868	.00478	.65868	.00478
.69150	.01482	.69150	.01482
.72402	.02117	.72402	.02117
.79118	.02597	.79118	.02597
.82601	.02561	.82601	.02561
.85978	.02388	.85978	.02388
.87004	.02304	.87004	.02304

COMPONENT = 2

UPPER SURFACE COORDINATES

INPUT		LOFTED	
X-IN	Z-IN	X-OUT	Z-OUT
0.00000	-.04147	.82704	-.01167
.00265	-.03517	.83248	-.00754
.01020	-.02561	.84380	-.00303
.01794	-.01747	.85458	.00014
.02780	-.00922	.86724	.00236
.03764	-.00275	.87900	.00304
.04843	.00258	.89101	.00226
.05935	.00661	.90248	.00029
.07115	.00958	.91418	-.00303
.08393	.01197	.92645	-.00735
.09492	.01392	.93694	-.01116
.11378	.01675	.95469	-.01814

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.13926	.02006	.97841	-.02801
.17027	.02264	1.00655	-.04128
.20413	.02381	1.03646	-.05720
.24172	.02303	1.06863	-.07667
.28080	.02039	1.10115	-.09850
.31579	.01644	1.12948	-.11941
.35536	.00986	1.16046	-.14490
.37640	.00553	1.17651	-.15917
.39053	.00242	1.18719	-.16893
.40000	0.00000	1.19419	-.17576

LOWER SURFACE COORDINATES

INPUT		LOFTED	
X-IN	Z-IN	X-OUT	Z-OUT
0.00000	-.04147	.82704	-.01167
.00954	-.04778	.83215	-.02190
.03199	-.04447	.85324	-.03026
.05701	-.04094	.87668	-.03972
.08426	-.03686	.90232	-.04981
.11373	-.03261	.92996	-.06086
.14616	-.02803	.96034	-.07311
.19625	-.02161	1.00693	-.09260
.24192	-.01528	1.04964	-.10995
.29008	-.00967	1.09416	-.12917
.33604	-.00494	1.13632	-.14805
.36932	-.00211	1.16656	-.16224
.38828	-.00010	1.18399	-.16998
.40000	0.00000	1.19419	-.17576

RADIUS OF CURVATURE ON FLAP UPPER SURFACE

X-COORD	Z-COORD	RADIUS
.82704	-.01167	-5.5420E-02
.83248	-.00754	-6.1597E-02
.84380	-.00303	-8.4486E-02
.85458	.00014	-1.2142E-01
.86724	.00236	-1.0316E-01
.87900	.00304	-1.0120E-01
.89101	.00226	-1.0663E-01
.90248	.00029	-1.1916E-01
.91418	-.00303	-2.0918E-01
.92645	-.00775	-5.6886E-01
.93694	-.01116	-7.6421E-01
.95469	-.01814	-7.9884E-01
.97841	-.02801	-7.1299E-01
1.00655	-.04128	-6.4833E-01
1.03646	-.05720	-6.8934E-01
1.06863	-.07667	-7.9601E-01
1.10115	-.09850	-7.8355E-01
1.12948	-.11941	-7.8051E-01
1.16046	-.14490	-8.7719E-01
1.17651	-.15917	-7.4471E-01
1.18719	-.16893	-4.2277E-01
1.19419	-.17576	-2.6866E-01

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AIRFOIL GEOMETRY AND SURFACE PRESSURE DISTRIBUTIONS

MACH NO. = .11500 ANGLE OF ATTACK = 5.60000 SWEEP ANGLE = 25.00000 ITERATION = 7

COMPONENT = 1 SURFACE = 1

X INPUT	Z INPUT	PRESSURE COEFFICIENT	SOURCE STRENGTH
.04809	-.04532	.99370	-.00488
.03746	-.04418	.97367	.00230
.02708	-.04278	.89911	.00098
.01842	-.04129	.75129	-.00011
.01340	-.04019	.51711	-.00008
.00886	-.03901	.11020	.00035
.00412	-.03722	-.72030	.00109
-.00038	-.03483	-2.71232	.00227
-.00422	-.03142	-6.08003	.00406
-.00599	-.02224	-9.37957	.00844
-.00398	-.01758	-9.95160	.00833
-.00157	-.01385	-8.60012	-.00110
.00216	-.00959	-7.55411	.00632
.00599	-.00608	-6.76042	.01672
.00972	-.00307	-5.92565	.01563
.01883	.00307	-5.08371	.01230
.02793	.00881	-4.60257	.01121
.03716	.01385	-4.19511	.00933
.05585	.02319	-3.84815	.00642
.07469	.03175	-3.70902	.00451
.09357	.03933	-3.69973	.00082
.11270	.04635	-4.03375	.00254
.12120	.04911	-4.03835	.01595
.12984	.05000	-3.47788	.01999
.15013	.05483	-3.22685	.00991
.17023	.05775	-2.99701	.00986
.21027	.06261	-2.63236	.00934
.25023	.06647	-2.37362	.00669
.32980	.07113	-2.17225	.00632
.37006	.07203	-2.01647	.00615
.44982	.07128	-1.87818	.00633
.48983	.06958	-1.75362	.00647
.56924	.06439	-1.63571	.00628
.62706	.05922	-1.49958	.00608
.74952	.04439	-1.37795	.00519
.78939	.03857	-1.32358	.00526
.82473	.03325	-1.29157	.00449
.85820	.02783	-1.26126	.00460
.87004	.02582	-1.25053	.00466

COMPONENT = 1 SURFACE = 2

X INPUT	Z INPUT	PRESSURE COEFFICIENT	SOURCE STRENGTH
.04809	-.04532	.99370	-.00638
.08880	-.04789	.96285	.00116
.12982	-.04882	.91213	.00057
.16995	-.05201	.86065	.00060

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.21000	-.05742	.80029	-.00017
.24986	-.06182	.74040	.00076
.28986	-.06486	.68241	.00230
.36992	-.06774	.62198	-.00034
.40998	-.06756	.57955	.00355
.49016	-.06251	.56136	-.00325
.53029	-.05835	.50366	.01317
.59296	-.05028	.53553	.00742
.60978	-.02750	.73589	.02083
.62852	-.01071	.85826	.03274
.65868	.00478	.85761	.03274
.69150	.01482	.84138	.03274
.72402	.02117	.80553	.02669
.79118	.02597	.66928	.01441
.82601	.02561	.21879	.00805
.85978	.02388	-.55664	.00188
.87004	.02304	-.79224	.00000

COMPONENT = 2 SURFACE = 3

X INPUT	Z INPUT	PRESSURE COEFFICIENT	SOURCE STRENGTH
.85324	-.03026	.93457	.00053
.83215	-.02190	.92298	-.01528
.82704	-.01167	.40195	-.00131
.83249	-.00754	-.17074	.00395
.84380	-.00303	-.41703	.00366
.85459	.00014	-.87932	.00255
.86724	.00236	-1.46592	.00297
.87900	.00304	-1.98420	.00753
.89101	.00226	-2.28443	.01220
.90249	.00029	-2.31430	.01671
.91418	-.00303	-2.09169	.02142
.92645	-.00735	-1.82404	.02646
.93694	-.01116	-1.64000	.03079
.95469	-.01814	-1.48347	.03618
.97841	-.02801	-1.33169	.04814
1.00655	-.04128	-1.16406	.06020
1.03646	-.05720	-.96155	.07333
1.06863	-.07667	-.73663	.08790
1.10115	-.09850	-.52016	.10308
1.12949	-.11941	-.30370	.11673
1.16046	-.14490	-.09006	.13228
1.17651	-.15917	.07242	.14060
1.18719	-.16893	.21615	.14621
1.19419	-.17576	.31021	.15000

COMPONENT = 2 SURFACE = 4

X INPUT	Z INPUT	PRESSURE COEFFICIENT	SOURCE STRENGTH
.85324	-.03026	.93457	-.02012
.87668	-.03972	.84384	.00254
.90232	-.04981	.80092	.00156
.92995	-.06086	.76470	.00096
.96034	-.07311	.72408	.00202
1.00693	-.09260	.67814	.00083
1.04964	-.10995	.63542	.00073

1.09416	-.12917	.59001	-.00047
1.13632	-.14805	.53693	.00054
1.16656	-.16224	.49758	.00255
1.18399	-.16998	.49060	.00081
1.19419	-.17576	.47067	.00044

COMPONENT	LIFT COEFFICIENT	MOMENTUM COEFFICIENT
1	2.52657	-.23536
2	.60474	-.45314

LAMINAR SEPARATION

INCOMPRESSIBLE BOUNDARY LAYER CALCULATIONS

***** RAE2215(FOSTER) DROOPED LEADING EDGE-30 DEG FLAP *****

RE	SWEEP ANGLE	ITERATION	SURFACE
3.800E+06	2.500E+01	7	1

LAMINAR BOUNDARY LAYER DEVELOPMENT

I	X	S	US	DU/NS	H	THETAS	CFS
1	.0481	0.0000	4.3001E-01	6.6657E-01	4.6440E+00	1.3245E-04	0.
6	.0240	.0586	5.6949E-01	9.3880E+00	2.1288E+00	6.8610E-05	5.8119E-03
11	.0009	.0864	1.8085E+00	1.1698E+02	2.2451E+00	1.6011E-05	6.8169E-03
16	-.0022	.1109	3.1798E+00	-3.0232E+01	3.2228E+00	2.6114E-05	4.0213E-04
17	.0009	.1158	3.0136E+00	-3.0799E+01	1.5416E+00	3.3204E-05	5.7090E-03

LAMINAR SEPARATION REATTACHMENT AS TURBULENT BOUNDARY LAYER

TURBULENT BOUNDARY LAYER DEVELOPMENT

I	X	S	US	H	DELTA S	THETAS	BETA	RTHETAS	CFS
17	.0009	.1158	3.014	1.542E+00	2.401E-04	3.320E-05	0.	3.802E+02	5.709E-03
22	.0200	.1404	2.490	1.600E+00	9.226E-04	1.337E-04	2.654E+00	1.265E+03	3.108E-03
27	.0411	.1651	2.302	1.566E+00	1.562E-03	2.206E-04	3.087E+00	1.930E+03	2.813E-03
32	.0629	.1898	2.230	1.520E+00	2.096E-03	2.839E-04	2.710E+00	2.406E+03	2.812E-03
37	.0852	.2145	2.210	1.478E+00	2.540E-03	3.288E-04	2.136E+00	2.761E+03	2.877E-03
42	.1079	.2392	2.264	1.418E+00	2.610E-03	3.362E-04	1.109E+00	2.893E+03	3.122E-03

105

47	.1313	.2640	2.154	1.468E+00	3.425E-03	4.381E-04	1.947E+00	3.585E+03	2.701E-03
52	.1550	.2887	2.085	1.491E+00	4.055E-03	5.332E-04	2.564E+00	4.225E+03	2.478E-03
57	.1791	.3135	2.023	1.506E+00	4.689E-03	6.260E-04	3.058E+00	4.813E+03	2.334E-03
62	.2032	.3384	1.968	1.517E+00	5.341E-03	7.213E-04	3.520E+00	5.395E+03	2.220E-03
67	.2273	.3633	1.923	1.522E+00	5.984E-03	8.126E-04	3.868E+00	5.939E+03	2.144E-03
72	.2515	.3882	1.884	1.525E+00	6.625E-03	9.021E-04	4.153E+00	6.458E+03	2.087E-03
77	.2757	.4131	1.867	1.512E+00	7.141E-03	9.592E-04	4.030E+00	6.807E+03	2.106E-03
82	.3000	.4380	1.851	1.501E+00	7.654E-03	1.017E-03	3.943E+00	7.153E+03	2.115E-03
87	.3242	.4629	1.834	1.494E+00	8.171E-03	1.077E-03	3.899E+00	7.508E+03	2.114E-03
92	.3485	.4879	1.811	1.495E+00	8.759E-03	1.156E-03	4.045E+00	7.953E+03	2.080E-03
97	.3727	.5129	1.786	1.498E+00	9.367E-03	1.240E-03	4.225E+00	8.415E+03	2.042E-03
102	.3970	.5379	1.774	1.490E+00	9.873E-03	1.297E-03	4.160E+00	8.742E+03	2.047E-03
107	.4213	.5629	1.762	1.485E+00	1.038E-02	1.354E-03	4.114E+00	9.069E+03	2.048E-03
112	.4456	.5879	1.750	1.480E+00	1.099E-02	1.414E-03	4.090E+00	9.403E+03	2.044E-03
117	.4698	.6129	1.730	1.484E+00	1.150E-02	1.500E-03	4.270E+00	9.861E+03	2.009E-03
122	.4941	.6379	1.711	1.488E+00	1.213E-02	1.589E-03	4.463E+00	1.033E+04	1.972E-03
127	.5183	.6630	1.700	1.485E+00	1.265E-02	1.650E-03	4.449E+00	1.066E+04	1.970E-03
132	.5425	.6881	1.689	1.482E+00	1.318E-02	1.713E-03	4.448E+00	1.100E+04	1.955E-03
137	.5667	.7132	1.679	1.479E+00	1.371E-02	1.778E-03	4.465E+00	1.134E+04	1.954E-03
142	.5909	.7382	1.662	1.483E+00	1.433E-02	1.867E-03	4.634E+00	1.179E+04	1.928E-03
147	.6151	.7634	1.645	1.488E+00	1.499E-02	1.964E-03	4.841E+00	1.227E+04	1.895E-03
152	.6392	.7885	1.633	1.488E+00	1.558E-02	2.042E-03	4.927E+00	1.267E+04	1.890E-03
157	.6633	.8136	1.625	1.484E+00	1.609E-02	2.099E-03	4.891E+00	1.297E+04	1.883E-03
162	.6874	.8388	1.618	1.481E+00	1.661E-02	2.158E-03	4.866E+00	1.327E+04	1.883E-03
167	.7115	.8639	1.611	1.478E+00	1.712E-02	2.218E-03	4.851E+00	1.357E+04	1.882E-03
172	.7356	.8891	1.603	1.476E+00	1.764E-02	2.279E-03	4.844E+00	1.388E+04	1.880E-03
177	.7597	.9143	1.595	1.475E+00	1.819E-02	2.348E-03	4.880E+00	1.423E+04	1.872E-03
182	.7837	.9394	1.584	1.476E+00	1.878E-02	2.428E-03	4.970E+00	1.461E+04	1.857E-03
187	.8077	.9646	1.577	1.475E+00	1.933E-02	2.494E-03	4.993E+00	1.494E+04	1.851E-03
192	.8317	.9898	1.570	1.474E+00	1.986E-02	2.558E-03	5.000E+00	1.526E+04	1.848E-03
197	.8557	1.0150	1.563	1.472E+00	2.039E-02	2.623E-03	5.014E+00	1.557E+04	1.843E-03
200	.8700	1.0302	1.559	1.472E+00	2.071E-02	2.662E-03	5.026E+00	1.577E+04	1.840E-03

LIFT COEFFICIENT = 3.131304
 SKIN FRICTION DRAG = .001620
 PRESSURE DRAG = .020763
 PROFILE DRAG COEFFICIENT = .022383
 MOMENT COEFFICIENT = -.688498

INCOMPRESSIBLE BOUNDARY LAYER CALCULATIONS

***** RAF2215(FOSTER) DROOPED LEADING EDGE-30 DEG FLAP *****

RE SWEEP ANGLE ITERATION SURFACE
 3.800E+06 2.500E+01 7. 2

LAMINAR BOUNDARY LAYER DEVELOPMENT

I	X	S	US	DU/DS	H	THETAS	CFS
1	.0481	0.0000	4.3001E-01	9.4699E-02	3.4708E+01	1.3245E-04	0.
6	.0694	.0829	4.4476E-01	2.8043E-01	2.5020E+00	1.4161E-04	2.1515E-03
11	.0906	.1393	4.6642E-01	4.7478E-01	2.3588E+00	1.6446E-04	2.0617E-03
16	.1119	.1841	4.9162E-01	6.6991E-01	2.2519E+00	1.7214E-04	2.1428E-03
21	.1332	.2225	5.1996E-01	6.7467E-01	2.2585E+00	1.6968E-04	2.0403E-03
26	.1544	.2573	5.4466E-01	7.6515E-01	2.2209E+00	1.6893E-04	2.0373E-03
31	.1756	.2898	5.7085E-01	8.2739E-01	2.3203E+00	1.6593E-04	1.8977E-03

36	.1968	.3205	5.9762E-01	9.1442E-01	2.3053E+00	1.6233E-04	1.8887E-03
41	.2179	.3499	6.2413E-01	8.4832E-01	2.2263E+00	1.5917E-04	1.8763E-03
46	.2391	.3783	6.4900E-01	9.0191E-01	2.2133E+00	1.5732E-04	1.8505E-03
51	.2603	.4059	6.7285E-01	8.1733E-01	2.2505E+00	1.5619E-04	1.7282E-03
56	.2815	.4330	6.9542E-01	8.5113E-01	2.2396E+00	1.5575E-04	1.6969E-03
61	.3028	.4596	7.1105E-01	4.1439E-01	2.4069E+00	1.5958E-04	1.3371E-03
66	.3241	.4859	7.2206E-01	4.2122E-01	2.3885E+00	1.6548E-04	1.2966E-03
71	.3454	.5121	7.3316E-01	4.2780E-01	2.3720E+00	1.7045E-04	1.2626E-03
76	.3666	.5380	7.4435E-01	4.4974E-01	2.3494E+00	1.7466E-04	1.2454E-03
81	.3879	.5638	7.5858E-01	5.7863E-01	2.2813E+00	1.7624E-04	1.3124E-03
86	.4093	.5893	7.7347E-01	3.9438E-01	2.3731E+00	1.7710E-04	1.1505E-03
91	.4305	.6147	7.7697E-01	1.2166E-01	2.5348E+00	1.8536E-04	9.0732E-04
96	.4518	.6401	7.8006E-01	1.2206E-01	2.5259E+00	1.9330E-04	8.7514E-04
101	.4730	.6654	7.8315E-01	1.2246E-01	2.5174E+00	2.0069E-04	8.4745E-04
106	.4943	.6906	7.8931E-01	7.3867E-01	2.2344E+00	2.0523E-04	1.2345E-03
111	.5155	.7157	8.0822E-01	7.6096E-01	2.2408E+00	2.0001E-04	1.2275E-03
116	.5366	.7406	8.1955E-01	-2.6703E-01	2.8992E+00	2.0591E-04	4.2845E-04
121	.5578	.7655	8.1292E-01	-2.6544E-01	2.9504E+00	2.1938E-04	3.6919E-04
124	.5704	.7805	8.0895E-01	-2.6447E-01	1.4885E+00	2.2745E-04	4.6744E-03

NATURAL TRANSITION

TURBULENT BOUNDARY LAYER DEVELOPMENT

I	X	S	US	H	DELTA S	THETAS	RETA	RTHETAS	CFS
124	.5704	.7805	.809	1.488E+00	1.736E-03	2.274E-04	0.	6.992E+02	4.674E-03
129	.5916	.8055	.802	1.497E+00	2.245E-03	2.970E-04	8.269E-01	9.055E+02	4.147E-03
134	.6048	.8314	.705	1.754E+00	3.924E-03	6.228E-04	1.691E+01	1.667E+03	2.301E-03
136	.6099	.8424	.665	2.067E+00	-2.316E-03	8.418E-04	4.261E+01	-9.783E+02	9.358E-04

TURBULENT SEPARATION

LIFT COEFFICIENT = 3.131304
 SKIN FRICTION DRAG = .000931
 PRESSURE DRAG = -.000533
 PROFILE DRAG COEFFICIENT = .000398
 MOMENT COEFFICIENT = -.688498

INCOMPRESSIBLE BOUNDARY LAYER CALCULATIONS

***** RAE2215 (FOSTER) DROOPED LEADING EDGE-30 DEG FLAP *****

RE SWEEP ANGLE ITERATION SURFACE
 3.800E+06 2.500E+01 7 4

LAMINAR BOUNDARY LAYER DEVELOPMENT

I	X	S	US	DU/DS	H	THETAS	CFS
1	.8532	0.0000	4.9400E-01	1.4985E+00	1.0214E+00	1.6178E-04	0.
6	.8619	.0166	5.2247E-01	1.9273E+00	2.4871E+00	5.7225E-05	4.6095E-03
11	.8705	.0316	5.5424E-01	2.3276E+00	2.3843E+00	7.1089E-05	3.9505E-03
16	.8792	.0454	5.8199E-01	8.7705E-01	2.5039E+00	7.9433E-05	2.9247E-03
21	.8878	.0598	5.9399E-01	9.1599E-01	2.4632E+00	9.0096E-05	2.6441E-03
26	.8965	.0719	6.0623E-01	9.5339E-01	2.4315E+00	9.8052E-05	2.4767E-03
31	.9052	.0847	6.1749E-01	6.9532E-01	2.4592E+00	1.0475E-04	2.1973E-03

30	.9138	.0974	6.2642E-01	7.1262E-01	2.4376E+00	1.1127E-04	2.0960E-03
41	.9225	.1099	6.3544E-01	7.2919E-01	2.4180E+00	1.1668E-04	2.0192E-03
46	.9311	.1223	6.4452E-01	7.0766E-01	2.4096E+00	1.2126E-04	1.9352E-03
51	.9398	.1346	6.5320E-01	7.1429E-01	2.3942E+00	1.2539E-04	1.8795E-03
56	.9484	.1467	6.6196E-01	7.2778E-01	2.3782E+00	1.2891E-04	1.8365E-03
61	.9571	.1588	6.7080E-01	7.4086E-01	2.3636E+00	1.3192E-04	1.7995E-03
66	.9657	.1707	6.7794E-01	5.0933E-01	2.4281E+00	1.3553E-04	1.6091E-03
71	.9743	.1826	6.8402E-01	5.1506E-01	2.4167E+00	1.3936E-04	1.5730E-03
76	.9829	.1944	6.9014E-01	5.2066E-01	2.4057E+00	1.4280E-04	1.5416E-03
81	.9915	.2062	6.9629E-01	5.2615E-01	2.3947E+00	1.4591E-04	1.5142E-03
86	1.0001	.2178	7.0247E-01	5.3151E-01	2.3844E+00	1.4872E-04	1.4897E-03
91	1.0087	.2295	7.0862E-01	5.1047E-01	2.3859E+00	1.5131E-04	1.4492E-03
96	1.0173	.2411	7.1455E-01	5.1472E-01	2.3766E+00	1.5380E-04	1.4284E-03
101	1.0259	.2526	7.2051E-01	5.1928E-01	2.3680E+00	1.5608E-04	1.4092E-03
106	1.0346	.2641	7.2649E-01	5.2374E-01	2.3598E+00	1.5816E-04	1.3916E-03
111	1.0432	.2755	7.3250E-01	5.2811E-01	2.3526E+00	1.6005E-04	1.3757E-03
116	1.0518	.2869	7.3846E-01	5.0642E-01	2.3570E+00	1.6183E-04	1.3423E-03
121	1.0603	.2982	7.4422E-01	5.1022E-01	2.3504E+00	1.6360E-04	1.3281E-03
126	1.0689	.3095	7.5001E-01	5.1395E-01	2.3442E+00	1.6523E-04	1.3147E-03
131	1.0775	.3207	7.5581E-01	5.1760E-01	2.3383E+00	1.6672E-04	1.3020E-03
136	1.0860	.3320	7.6164E-01	5.2118E-01	2.3326E+00	1.6809E-04	1.2900E-03
141	1.0946	.3431	7.6752E-01	5.7530E-01	2.3041E+00	1.6933E-04	1.3141E-03
146	1.1031	.3543	7.7430E-01	6.1090E-01	2.2865E+00	1.6989E-04	1.3257E-03
151	1.1116	.3654	7.8111E-01	6.1539E-01	2.2829E+00	1.7039E-04	1.3158E-03
156	1.1201	.3764	7.8793E-01	6.1978E-01	2.2795E+00	1.7083E-04	1.3061E-03
161	1.1286	.3874	7.9478E-01	6.2407E-01	2.2763E+00	1.7121E-04	1.2967E-03
166	1.1371	.3984	8.0164E-01	6.1688E-01	2.2785E+00	1.7154E-04	1.2799E-03
171	1.1455	.4094	8.0837E-01	6.1642E-01	2.2774E+00	1.7193E-04	1.2680E-03
176	1.1539	.4203	8.1512E-01	6.2024E-01	2.2746E+00	1.7226E-04	1.2591E-03
181	1.1624	.4311	8.2188E-01	6.2397E-01	2.2719E+00	1.7255E-04	1.2505E-03
186	1.1709	.4420	8.2776E-01	4.6060E-01	2.3473E+00	1.7336E-04	1.1311E-03
191	1.1794	.4528	8.3275E-01	4.6254E-01	2.3429E+00	1.7465E-04	1.1219E-03
196	1.1877	.4636	8.3762E-01	4.3649E-01	2.3528E+00	1.7595E-04	1.0940E-03
200	1.1942	.4722	8.4139E-01	4.3783E-01	2.3494E+00	1.7702E-04	1.0870E-03

BOUNDARY LAYER DEVELOPMENT ON FLAP UPPER SURFACE IN SLOT REGION

INCOMPRESSIBLE BOUNDARY LAYER CALCULATIONS

**** RAE2215(FOSTER) DROOPED LEADING EDGE-30 DEG FLAP ****

RE	SWEEP ANGLE	ITERATION	SURFACE
3.800E+06	2.500E+01	7	3

TURBULENT BOUNDARY LAYER DEVELOPMENT

I	X	S	US	H	DELTAS	THETAS	BETA	RTHETAS	CFS
1	.8532	0.0000	.494	1.410E+00	4.508E-03	5.327E-04	0.	1.000E+03	4.556E-03
6	.8426	.0218	.500	1.402E+00	4.568E-03	5.327E-04	-1.574E+00	1.012E+03	4.596E-03
11	.8320	.0428	.512	1.343E+00	3.826E-03	4.018E-04	-6.808E+00	7.787E+02	5.603E-03
16	.8273	.0573	.893	1.140E+00	1.462E-03	8.280E-05	-1.024E+01	2.808E+02	1.180E-02
21	.8371	.0697	1.203	1.199E+00	1.137E-03	8.114E-05	-8.598E+00	3.708E+02	9.519E-03
26	.8478	.0819	1.327	1.260E+00	1.152E-03	9.948E-05	-7.704E+00	5.017E+02	7.615E-03
31	.8590	.0939	1.501	1.275E+00	1.129E-03	1.016E-04	-6.864E+00	5.795E+02	6.990E-03

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

.00006	6.296E-01	7.324E-01	1.416E+02	1.160E+04	-2.798E-03	7.090E-04	-5.085E+04	2.185E+02
.00007	6.850E-01	7.968E-01	1.541E+02	8.083E+03	-3.731E-03	1.232E-03	-5.083E+04	2.185E+02
.00009	7.195E-01	8.369E-01	1.619E+02	5.508E+03	-4.664E-03	1.642E-03	-5.082E+04	2.184E+02
.00011	7.462E-01	8.680E-01	1.679E+02	4.060E+03	-5.596E-03	2.039E-03	-5.080E+04	2.184E+02
.00015	7.871E-01	9.156E-01	1.771E+02	3.232E+03	-7.462E-03	3.515E-03	-5.076E+04	2.184E+02
.00019	8.180E-01	9.516E-01	1.840E+02	2.509E+03	-9.327E-03	4.248E-03	-5.073E+04	2.184E+02
.00022	8.429E-01	9.805E-01	1.896E+02	1.905E+03	-1.119E-02	4.248E-03	-5.069E+04	2.183E+02
.00030	8.815E-01	1.025E+00	1.983E+02	1.536E+03	-1.492E-02	3.843E-03	-5.062E+04	2.183E+02
.00037	9.112E-01	1.060E+00	2.050E+02	1.206E+03	-1.865E-02	2.781E-03	-5.055E+04	2.182E+02
.00045	9.352E-01	1.088E+00	2.104E+02	8.389E+02	-2.238E-02	1.468E-03	-5.048E+04	2.181E+02
.00060	9.671E-01	1.125E+00	2.176E+02	3.591E+02	-2.985E-02	0.	-5.034E+04	2.180E+02
.00075	9.671E-01	1.125E+00	2.176E+02	0.	-3.731E-02	0.	-5.020E+04	2.179E+02
.00090	9.671E-01	1.125E+00	2.176E+02	-2.889E+00	-4.477E-02	0.	-5.006E+04	2.177E+02
.00120	9.670E-01	1.124E+00	2.175E+02	-8.712E+00	-5.969E-02	0.	-4.978E+04	2.175E+02
.00149	9.659E-01	1.123E+00	2.173E+02	-1.309E+01	-7.462E-02	0.	-4.950E+04	2.172E+02
.00179	9.648E-01	1.122E+00	2.170E+02	-1.309E+01	-8.954E-02	0.	-4.922E+04	2.170E+02
.00239	9.626E-01	1.119E+00	2.166E+02	-1.309E+01	-1.194E-01	0.	-4.866E+04	2.164E+02
.00299	9.604E-01	1.116E+00	2.161E+02	-1.309E+01	-1.492E-01	0.	-4.810E+04	2.159E+02
.00359	9.582E-01	1.114E+00	2.156E+02	-1.309E+01	-1.791E-01	0.	-4.754E+04	2.154E+02
.00418	9.560E-01	1.111E+00	2.151E+02	-1.489E+01	-2.089E-01	0.	-4.698E+04	2.149E+02
.00538	9.507E-01	1.104E+00	2.139E+02	-1.869E+01	-2.686E-01	0.	-4.602E+04	2.136E+02
.00657	9.435E-01	1.095E+00	2.123E+02	-2.159E+01	-3.283E-01	0.	-4.544E+04	2.114E+02
.00777	9.362E-01	1.087E+00	2.106E+02	-2.129E+01	-3.880E-01	0.	-4.486E+04	2.101E+02
.01016	9.221E-01	1.069E+00	2.074E+02	-1.797E+01	-5.074E-01	0.	-4.366E+04	2.068E+02
.01255	9.122E-01	1.057E+00	2.052E+02	-2.312E+01	-6.268E-01	0.	-4.180E+04	2.044E+02
.01494	8.862E-01	1.031E+00	1.994E+02	-6.002E+01	-7.462E-01	2.960E-02	-3.995E+04	2.020E+02
.01733	8.232E-01	9.575E-01	1.852E+02	-1.303E+02	-8.655E-01	1.010E-01	-3.747E+04	2.005E+02
.01972	7.008E-01	8.152E-01	1.577E+02	-2.420E+02	-9.849E-01	1.725E-01	-3.498E+04	1.989E+02
.02211	4.790E-01	5.572E-01	1.078E+02	-9.747E+01	-1.104E+00	2.021E-01	-3.183E+04	1.980E+02
.02450	5.622E-01	6.539E-01	1.265E+02	1.032E+02	-1.224E+00	2.018E-01	-2.859E+04	1.972E+02
.02689	6.258E-01	7.280E-01	1.408E+02	8.612E+01	-1.343E+00	2.011E-01	-2.525E+04	1.966E+02
.02928	6.847E-01	7.964E-01	1.540E+02	7.554E+01	-1.462E+00	1.989E-01	-2.188E+04	1.962E+02
.03407	7.870E-01	9.154E-01	1.771E+02	5.925E+01	-1.701E+00	1.820E-01	-1.642E+04	1.955E+02
.03885	8.532E-01	9.925E-01	1.920E+02	2.666E+01	-1.940E+00	1.336E-01	-1.214E+04	1.948E+02
.04363	8.666E-01	1.004E+00	1.950E+02	0.	-2.179E+00	6.571E-02	-9.007E+03	1.941E+02
.04841	1.000E+00	1.000E+00	1.934E+02	0.	-2.418E+00	1.878E-02	-6.652E+03	1.934E+02

	BETA	US	WC
1	0.	0.	0.
2	2.1396E+01	2.1396E+01	-1.4169E-01
3	4.2792E+01	4.2792E+01	-2.8339E-01
4	6.3322E+01	6.3321E+01	-4.1934E-01
5	8.0340E+01	8.0339E+01	-5.3204E-01
6	1.0564E+02	1.0564E+02	-6.9961E-01
7	1.2326E+02	1.2326E+02	-8.1625E-01
8	1.3605E+02	1.3604E+02	-9.0094E-01
9	1.4559E+02	1.4559E+02	-9.6416E-01
10	1.5840E+02	1.5839E+02	-1.0490E+00
11	1.6636E+02	1.6636E+02	-1.1017E+00
12	1.7255E+02	1.7255E+02	-1.1427E+00
13	1.8201E+02	1.8201E+02	-1.2053E+00
14	1.8916E+02	1.8916E+02	-1.2527E+00
15	1.9491E+02	1.9490E+02	-1.2907E+00
16	2.0385E+02	2.0384E+02	-1.3499E+00
17	2.1069E+02	2.1069E+02	-1.3953E+00
18	2.1624E+02	2.1624E+02	-1.4320E+00
19	2.2363E+02	2.2362E+02	-1.4809E+00
20	2.2363E+02	2.2362E+02	-1.4809E+00
21	2.2363E+02	2.2362E+02	-1.4809E+00
22	2.2354E+02	2.2353E+02	-1.4667E+00

23	2.2327E+02	-6.5460E-03	2.2327E+02	-1.4615E+00
24	2.2300E+02	-6.5305E-03	2.2300E+02	-1.4563E+00
25	2.2247E+02	-6.4993E-03	2.2246E+02	-1.4459E+00
26	2.2193E+02	-6.4679E-03	2.2192E+02	-1.4354E+00
27	2.2139E+02	-6.4362E-03	2.2139E+02	-1.4249E+00
28	2.2086E+02	-6.4043E-03	2.2085E+02	-1.4144E+00
29	2.1956E+02	-6.3265E-03	2.1956E+02	-1.3891E+00
30	2.1779E+02	-6.2179E-03	2.1779E+02	-1.3542E+00
31	2.1602E+02	-6.1066E-03	2.1602E+02	-1.3192E+00
32	2.1256E+02	-5.8809E-03	2.1255E+02	-1.2500E+00
33	2.1013E+02	-5.7162E-03	2.1013E+02	-1.2011E+00
34	2.0492E+02	-6.6224E-03	2.0491E+02	-1.3570E+00
35	1.9035E+02	-6.6224E-03	1.9034E+02	-1.2605E+00
36	1.6206E+02	-6.6224E-03	1.6205E+02	-1.0732E+00
37	1.1076E+02	-6.6224E-03	1.1076E+02	-7.3348E-01
38	1.3000E+02	-6.6224E-03	1.2999E+02	-8.6087E-01
39	1.4471E+02	-6.6224E-03	1.4471E+02	-9.5834E-01
40	1.5832E+02	-6.6224E-03	1.5832E+02	-1.0485E+00
41	1.8198E+02	-6.6224E-03	1.8198E+02	-1.2051E+00
42	1.9730E+02	-6.6224E-03	1.9729E+02	-1.3066E+00
43	1.9956E+02	-5.6350E-03	1.9956E+02	-1.1245E+00
44	2.0066E+02	2.9756E-02	2.0057E+02	5.9698E+00

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

X	CBETA	CF2(3)	CFR	CFS	CFC	WB(3)	ALPAN
5.9575	-.3794	3.1366E-03	3.2240E-03	3.2239E-03	-2.1350E-05	5.3461E+01	1.3747E+01
H	DELTA-STAR	THETA					
1.6098	2.2715E-01	1.4110E-01					

110

***** RAE2215(FOSTER) DROOPED LEADING EDGE-30 DEG FLAP *****

AT X = 30.58633949

AT X = 30.58633949

OX = 3.000E-02
DELTA = 8.316E+00
DELS = 1.100E-01
THETA = 8.347E-02
H = 1.318E+00
UD = 1.990E+01
U = 1.279E+02

UTAU = 4.574E+00
CF2(1) = 1.941E-03
CF2(2) = 1.941E-03
CF2(3) = 1.931E-03
ITER = 1
PRF NO=1048
R(3) = 1.756E+01

Y	X = 30.55633949 W	X = 30.58633949 U	X = 30.58633949 UP	DU/DY	V	EDDY	P-GRAD	U-INVISCID
0.00000	0.	0.	0.	1.133E+05	0.	0.	1.357E+04	1.048E+02
.00000	3.550E-02	2.308E-02	2.952E+00	9.452E+03	1.001E-04	8.777E-09	1.357E+04	1.048E+02
.00001	7.099E-02	4.620E-02	5.908E+00	9.466E+03	4.005E-04	1.394E-07	1.358E+04	1.048E+02
.00001	1.065E-01	6.935E-02	8.868E+00	9.478E+03	9.010E-04	7.002E-07	1.358E+04	1.048E+02
.00002	1.420E-01	9.252E-02	1.183E+01	9.480E+03	1.601E-03	2.192E-06	1.358E+04	1.048E+02
.00003	2.177E-01	1.389E-01	1.776E+01	9.458E+03	3.598E-03	1.084E-05	1.358E+04	1.048E+02
.00004	2.829E-01	1.850E-01	2.365E+01	9.368E+03	6.381E-03	3.316E-05	1.358E+04	1.048E+02
.00005	3.519E-01	2.304E-01	2.947E+01	9.235E+03	9.926E-03	7.786E-05	1.358E+04	1.048E+02
.00006	4.198E-01	2.752E-01	3.520E+01	6.035E+03	1.470E-02	1.027E-04	1.358E+04	1.048E+02

8	3.4962E+01	9.6505E-02	3.4799E+01	3.3687E+00
9	4.1743E+01	9.5859E-02	4.1551E+01	3.9953E+00

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

.00007	4.856E-01	3.189E-01	4.078E+01	4.307E+03	2.415E-02	2.187E-04	1.359E+04	1.048E+02
.00009	5.460E-01	3.594E-01	4.596E+01	4.019E+03	3.532E-02	4.677E-04	1.359E+04	1.048E+02
.00011	6.024E-01	3.975E-01	5.083E+01	2.495E+03	4.757E-02	5.624E-04	1.360E+04	1.048E+02
.00015	6.536E-01	4.326E-01	5.532E+01	1.644E+03	7.390E-02	1.010E-03	1.360E+04	1.048E+02
.00019	6.950E-01	4.617E-01	5.905E+01	1.420E+03	1.017E-01	1.818E-03	1.361E+04	1.048E+02
.00022	7.318E-01	4.881E-01	6.242E+01	8.642E+02	1.307E-01	1.945E-03	1.362E+04	1.048E+02
.00030	7.645E-01	5.124E-01	6.553E+01	5.681E+02	1.908E-01	2.884E-03	1.363E+04	1.049E+02
.00037	7.900E-01	5.325E-01	6.810E+01	4.983E+02	2.526E-01	4.442E-03	1.365E+04	1.049E+02
.00045	8.130E-01	5.514E-01	7.052E+01	3.222E+02	3.158E-01	4.372E-03	1.366E+04	1.049E+02
.00060	8.344E-01	5.703E-01	7.294E+01	2.282E+02	4.448E-01	5.709E-03	1.369E+04	1.050E+02
.00075	8.514E-01	5.871E-01	7.508E+01	2.127E+02	5.760E-01	8.363E-03	1.372E+04	1.050E+02
.00090	8.669E-01	6.036E-01	7.719E+01	1.446E+02	7.089E-01	8.193E-03	1.375E+04	1.051E+02
.00120	8.816E-01	6.210E-01	7.942E+01	1.067E+02	9.776E-01	1.075E-02	1.381E+04	1.051E+02
.00149	8.930E-01	6.370E-01	8.146E+01	1.023E+02	1.249E+00	1.611E-02	1.387E+04	1.052E+02
.00179	9.034E-01	6.530E-01	8.351E+01	7.091E+01	1.521E+00	1.608E-02	1.393E+04	1.053E+02
.00239	9.131E-01	6.702E-01	8.571E+01	5.339E+01	2.069E+00	2.152E-02	1.405E+04	1.055E+02
.00299	9.205E-01	6.864E-01	8.778E+01	4.916E+01	2.619E+00	3.096E-02	1.417E+04	1.057E+02
.00359	9.263E-01	7.010E-01	8.964E+01	4.727E+01	3.167E+00	4.286E-02	1.429E+04	1.059E+02
.00418	9.315E-01	7.160E-01	9.156E+01	3.430E+01	3.714E+00	4.234E-02	1.441E+04	1.061E+02
.00538	9.364E-01	7.332E-01	9.376E+01	2.982E+01	4.795E+00	5.354E-02	1.416E+04	1.065E+02
.00657	9.399E-01	7.533E-01	9.634E+01	3.473E+01	5.826E+00	5.389E-02	1.288E+04	1.073E+02
.00777	9.423E-01	7.766E-01	9.932E+01	2.576E+01	6.760E+00	5.495E-02	1.160E+04	1.081E+02
.01016	9.417E-01	8.016E-01	1.025E+02	1.468E+01	8.329E+00	5.914E-02	9.145E+03	1.096E+02
.01255	9.370E-01	8.134E-01	1.040E+02	4.892E+00	9.585E+00	6.599E-02	8.092E+03	1.106E+02
.01494	9.282E-01	8.139E-01	1.041E+02	-4.528E+00	1.058E+01	7.528E-02	7.039E+03	1.117E+02
.01733	9.160E-01	8.021E-01	1.026E+02	-1.316E+01	1.135E+01	8.674E-02	6.490E+03	1.125E+02
.01972	9.014E-01	7.810E-01	9.987E+01	-1.964E+01	1.193E+01	1.000E-01	5.953E+03	1.134E+02
.02211	8.852E-01	7.529E-01	9.628E+01	-2.417E+01	1.233E+01	1.147E-01	5.607E+03	1.141E+02
.02450	8.682E-01	7.205E-01	9.213E+01	-2.767E+01	1.262E+01	1.303E-01	5.286E+03	1.148E+02
.02689	8.501E-01	6.837E-01	8.743E+01	-3.303E+01	1.281E+01	1.465E-01	5.048E+03	1.154E+02
.02928	8.281E-01	6.378E-01	8.156E+01	-2.436E+01	1.298E+01	1.626E-01	4.831E+03	1.160E+02
.03407	8.059E-01	5.923E-01	7.574E+01	-1.505E+01	1.337E+01	1.929E-01	4.493E+03	1.171E+02
.03885	7.896E-01	5.625E-01	7.193E+01	-8.992E+00	1.392E+01	2.177E-01	4.227E+03	1.181E+02
.04363	7.783E-01	5.472E-01	6.998E+01	-3.443E+00	1.469E+01	2.338E-01	4.007E+03	1.189E+02
.04841	7.715E-01	5.453E-01	6.973E+01	1.719E+00	1.571E+01	2.394E-01	3.820E+03	1.197E+02
.05319	7.690E-01	5.559E-01	7.108E+01	6.478E+00	1.702E+01	2.394E-01	3.656E+03	1.205E+02
.05797	7.709E-01	5.777E-01	7.388E+01	1.059E+01	1.863E+01	2.394E-01	3.510E+03	1.212E+02
.06275	7.773E-01	6.088E-01	7.786E+01	1.379E+01	2.050E+01	2.394E-01	3.379E+03	1.218E+02
.06753	7.885E-01	6.467E-01	8.270E+01	1.584E+01	2.258E+01	2.393E-01	3.258E+03	1.224E+02
.07232	8.043E-01	6.881E-01	8.799E+01	1.683E+01	2.479E+01	2.390E-01	3.148E+03	1.230E+02
.07710	8.251E-01	7.309E-01	9.347E+01	1.733E+01	2.704E+01	2.383E-01	3.045E+03	1.235E+02
.08188	8.518E-01	7.748E-01	9.909E+01	1.734E+01	2.930E+01	2.368E-01	2.948E+03	1.240E+02
.08666	8.838E-01	8.177E-01	1.046E+02	1.630E+01	3.150E+01	2.338E-01	2.858E+03	1.245E+02
.09144	9.175E-01	8.564E-01	1.095E+02	1.427E+01	3.351E+01	2.284E-01	2.773E+03	1.249E+02
.09622	9.481E-01	8.891E-01	1.137E+02	1.192E+01	3.520E+01	2.194E-01	2.691E+03	1.253E+02
.10100	9.719E-01	9.161E-01	1.172E+02	9.859E+00	3.659E+01	2.058E-01	2.609E+03	1.258E+02
.10578	9.876E-01	9.385E-01	1.200E+02	8.283E+00	3.774E+01	1.870E-01	2.528E+03	1.262E+02
.11056	9.961E-01	9.575E-01	1.225E+02	7.138E+00	3.871E+01	1.633E-01	2.446E+03	1.266E+02
.11535	9.997E-01	9.742E-01	1.246E+02	6.383E+00	3.954E+01	1.359E-01	2.364E+03	1.270E+02
.12013	1.001E+00	9.895E-01	1.265E+02	5.159E+00	4.025E+01	1.071E-01	2.283E+03	1.275E+02
.12491	1.000E+00	1.000E+00	1.279E+02	0.	4.051E+01	7.938E-02	2.201E+03	1.279E+02

III

J	UR	BETA	US	WC
1	0.	1.0005E-01	0.	0.
2	3.5090E+00	9.4885E-02	3.4916E+00	3.4922E-01
3	7.0218E+00	9.9310E-02	6.9872E+00	6.9826E-01
4	1.5031E+01	9.8645E-02	1.3880E+01	1.0411E+00

8	3.4962E+01	9.6505E-02	3.4799E+01	3.3687E+00
9	4.1743E+01	9.5859E-02	4.1551E+01	3.9953E+00
10	4.8344E+01	9.5090E-02	4.8125E+01	4.5901E+00
11	5.4450E+01	9.4076E-02	5.4210E+01	5.1149E+00
12	6.0173E+01	9.2970E-02	5.9913E+01	5.5862E+00
13	6.5431E+01	9.1596E-02	6.5156E+01	5.9848E+00
14	6.9767E+01	8.9925E-02	6.9485E+01	6.2454E+00
15	7.3666E+01	8.8133E-02	7.3380E+01	6.4840E+00
16	7.7232E+01	8.5932E-02	7.6947E+01	6.6285E+00
17	8.0134E+01	8.3401E-02	7.9856E+01	6.6755E+00
18	8.2833E+01	8.0644E-02	8.2563E+01	6.6727E+00
19	8.5493E+01	7.7185E-02	8.5239E+01	6.5923E+00
20	8.7798E+01	7.3263E-02	8.7563E+01	6.4266E+00
21	9.0033E+01	6.9014E-02	8.9818E+01	6.2086E+00
22	9.2347E+01	6.3852E-02	9.2159E+01	5.8925E+00
23	9.4414E+01	5.8375E-02	9.4254E+01	5.5083E+00
24	9.6469E+01	5.2605E-02	9.6336E+01	5.0724E+00
25	9.8636E+01	4.5977E-02	9.8532E+01	4.5334E+00
26	1.0063E+02	3.9232E-02	1.0056E+02	3.9470E+00
27	1.0241E+02	3.2945E-02	1.0236E+02	3.3733E+00
28	1.0423E+02	2.6409E-02	1.0419E+02	2.7522E+00
29	1.0629E+02	1.8675E-02	1.0627E+02	1.9848E+00
30	1.0865E+02	9.0347E-03	1.0865E+02	9.8161E-01
31	1.1136E+02	-2.3442E-03	1.1136E+02	-2.6105E-01
32	1.1421E+02	-1.5221E-02	1.1420E+02	-1.7384E+00
33	1.1545E+02	-2.2947E-02	1.1542E+02	-2.6489E+00
34	1.1530E+02	-2.6847E-02	1.1526E+02	-3.0952E+00
35	1.1366E+02	-2.6286E-02	1.1362E+02	-2.9873E+00
36	1.1089E+02	-2.2184E-02	1.1086E+02	-2.4596E+00
37	1.0728E+02	-1.4910E-02	1.0727E+02	-1.5995E+00
38	1.0317E+02	-5.0786E-03	1.0317E+02	-5.2794E-01
39	9.8535E+01	7.6248E-03	9.8532E+01	7.5130E-01
40	9.2807E+01	2.5561E-02	9.2776E+01	2.3719E+00
41	8.7134E+01	4.5473E-02	8.7044E+01	3.9608E+00
42	8.3406E+01	5.8942E-02	8.3261E+01	4.9133E+00
43	8.1419E+01	6.4697E-02	8.1248E+01	5.2639E+00
44	8.1016E+01	6.2403E-02	8.0859E+01	5.0524E+00
45	8.2115E+01	5.2614E-02	8.2001E+01	4.3184E+00
46	8.4595E+01	3.7112E-02	8.4537E+01	3.1387E+00
47	8.8255E+01	1.8546E-02	8.8239E+01	1.6766E+00
48	9.2826E+01	-3.4463E-04	9.2826E+01	-3.1991E-02
49	9.7940E+01	-1.7192E-02	9.7926E+01	-1.6837E+00
50	1.0336E+02	-3.0815E-02	1.0331E+02	-3.1845E+00
51	1.0905E+02	-4.0929E-02	1.0896E+02	-4.4621E+00
52	1.1475E+02	-4.7333E-02	1.1462E+02	-5.4294E+00
53	1.2000E+02	-5.0653E-02	1.1985E+02	-6.0760E+00
54	1.2449E+02	-5.2404E-02	1.2431E+02	-6.5205E+00
55	1.2816E+02	-5.4272E-02	1.2797E+02	-6.9518E+00
56	1.3111E+02	-5.7270E-02	1.3090E+02	-7.5046E+00
57	1.3353E+02	-6.1536E-02	1.3328E+02	-8.2116E+00
58	1.3556E+02	-6.6489E-02	1.3526E+02	-9.0065E+00
59	1.3738E+02	-7.1717E-02	1.3703E+02	-9.8441E+00
60	1.3861E+02	-7.5766E-02	1.3821E+02	-1.0491E+01

X	BETA	CF2(3)	CFR	CFS	CFC	WB(3)	ALPAN
30.5863	5.7325	1.9313E-03	2.2966E-03	2.2851E-03	2.2939E-04	5.3461E+01	2.7029E+01
H	DELTA-STAR	THETA					
1.4482	1.9380E+00	1.3382E+00					

VALUES OF DISPLACEMENT THICKNESS, MOMENTUM THICKNESS,
AND SHAPE FACTOR FOR THE WHOLE BOUNDARY LAYER (LAST PROFILE).

DELS = 2.602E+00 THETA = 1.192E+00 H = 2.182E+00.

LIFT COEFFICIENT PROFILE DRAG COEFFICIENT

CL = 3.131E+00 CD = 5.369E-02

LIFT DRAG AND MOMENT SUMMARY TABLE

ITERATION	LIFT COEFFICIENT	MOMENTUM COEFFICIENT	DRAG COEFFICIENT
1	3.40395	-.78079	.05163
2	3.29825	-.73431	.05485
3	3.21873	-.71122	.05843
4	3.17688	-.69957	.05885
5	3.15483	-.69363	.05382
6	3.13692	-.69026	.05382
7	3.13130	-.68850	.05388

APPENDIX VI
PROGRAM LISTING

REPRODUCIBILITY OF THE
OPTION IS POOR

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OVERLAY (FR15,0,0)
PROGRAM VIP (INPUT=1001,TAPE5=INPUT,OUTPUT=1001,TAPE6=OUTPUT, VIP.3
1TAPE1=1001,TAPE3=1001,TAPE7=1001,TAPE8=1001,TAPE9=1001, VIP.4
2TAPE10=1001,TAPE11=1001,TAPE12=1001) VIP.5
C INFINITE SPAN THREE DIMENSIONAL HIGH LIFT VISCOUS/POTENTIAL FLOW VIP.6
C INTERACTION PROGRAM VIP.7
C VIP.8
COMMON/NXT/NXT VIP.9
COMMON/NBL/NBL VIP.10
COMMON /ANGLE/ ANGLE VIP.11
COMMON /CL/ CL,CCT,CDF,CDP,DUD(2),CM VIP.12
COMMON /CPS/ CPS(600) VIP.13
COMMON/GAMM/GA(600),O(600) VIP.14
COMMON/GRID/ ZCP(20),CPI(20,30),YGAP VIP.15
COMMON/SLOT/HSS(100),TSS(100),OSS(100),CSS(100),USS(100),OTSS(100) VIP.16
COMMON/CURVES/ R(30,2) VIP.17
COMMON/XGEM/ IGEN VIP.18
COMMON/CLCM/ CLX(4),CMX(4) VIP.19
COMMON/PHIL/IPHIL VIP.20
COMMON/XFND/XFIND(20),NXFIND VIP.21
COMMON/ARC/ TOLL1,TOLL2 VIP.22
COMMON /NUS/ NUS VIP.23
COMMON /NPT/ NPT VIP.24
COMMON/SWEEP/ HHI,RRTH1,KSW VIP.25
COMMON/TOTQ/CONS,GNEOK,XGNO VIP.26
COMMON/NANGLE/NANGLE VIP.27
COMMON/KPRINT/KPRINT VIP.28
COMMON /NSIDE/ NSIDE VIP.29
COMMON /ITR/ ITR,ITRMAX VIP.30
COMMON /IPRINT/ IPRINT,XSKIP VIP.31
COMMON/INSTB/ INSTB,ITFAN VIP.32
COMMON/MTRAN/ MTRAN VIP.33
COMMON/XTRIP/ KCODE,TRIP VIP.34
COMMON/GAP/ ZGAP(2),SXU(2) VIP.35
COMMON/XSOLVE/ISOLVE VIP.36
COMMON /JMAX/ JMAX VIP.37
COMMON /PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UIIN,REFX,REFZ,CREF VIP.38
COMMON/FSTART/ CFI,HI,THETA1,UTE VIP.39
COMMON /SANGLE/ SANGLE VIP.40
COMMON/SEG/NCMPT,NFLAP,NF,NC(4),TE(12),NPU(4),NPL(4),DUM(42) VIP.41
COMMON /SIG/ SIG(200),SIGMAD(200),SIGMA(8,100) VIP.42
COMMON /RNB/ RNB VIP.43
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100) VIP.44
COMMON /TRIPUL/ TRIPUP,TRIPOP VIP.45
COMMON/DENSE/SSS(200),USD(200) VIP.46
COMMON /TITLE/ TITLE(8) VIP.47
COMMON /VELCOM/ NPOINT,NPART,IMAX,EX,PRINT VIP.48
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200), VIP.49
ICF2(200),DEL(200),DELST2(200),DELT(200),H(200),HHDS(200),H1(200), VIP.50
2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200), VIP.51
3S(200),U(200),DU(200),SJD(200),UUD(200),THET12(200),THET21(200), VIP.52
4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(6400), VIP.53
5XIP(8,100),ZIP(8,100),CPIP(8,100),NPP(8),DUMMY(192) VIP.54
DIMENSION CPU(200),CPL(100) VIP.55
DIMENSION CL5(8),CMS(8),CDS(8) VIP.56
REAL MACH VIP.57
C DATA FR15/4HFR15/ VIP.58
MTRAN = 1 VIP.59
READ(5,5200) (TITLE(I),I=1,8) VIP.60
WRITE(6,6200) (TITLE(I),I=1,8) VIP.61
6200 FORMAT(1H1,40X,8A10//) VIP.62
READ(5,6700) XXFIND,XPHIL,TOLL1,TOLL2,XSOLVE,XGEM VIP.63
NXFIND = INT(XXFIND) VIP.64
IPHIL = INT(XPHIL) VIP.65
ISOLVE = INT(XSOLVE) VIP.66
IGEM = INT(XGEM) VIP.67
VIP.68
VIP.69

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	IF(NXFIND.EQ.0) GO TO 30	VIP.70
	READ(5,6700)(XFIND(I),I=1,NXFIND)	VIP.71
	IF(NXFIND.GT.20) STOP 7777	VIP.72
6700	FORMAT(8F10.0)	VIP.73
30	CONTINUE	VIP.74
	READ(5,5000) RNB,TRIPUP,TRIPOP,SANGLE,TRMAX,REFC,UTIN	VIP.75
	IF(REFC.EQ.0.) REFC=1.0	VIP.76
	READ(5,5000) XPRINT,XSKIP,REFX,REFZ,CREF,PRINT,CASE	VIP.77
	MCASE = INT(CASE)	VIP.78
	KPRINT = INT(PRINT)	VIP.79
	IF(MCASE.EQ.0) MCASE = 1	VIP.80
	NANGLE = 1	VIP.81
	DO 40 NSIDE = 1,8	VIP.82
	DO 40 I = 1,100	VIP.83
40	SIGMA(NSIDE,I) = 0.	VIP.84
	RNB=RNB*1.0E06	VIP.85
	ITR = 1	VIP.86
	ITRMAX=INT(ITRMAX)	VIP.87
	KAMAX = ITRMAX	VIP.88
	IPRINT=INT(XPRINT)	VIP.89
	KSKIP=INT(XSKIP)	VIP.90
C		VIP.91
C	INPUT INITIAL GEOMETRY AND CALCULATE THE POTENTIAL FLOW	VIP.92
C		VIP.93
100	CONTINUE	VIP.94
	CALL OVERLAY(FRIS,1,0)	VIP.95
	IF(MACH.LT.0.) CALL EXIT	VIP.96
	CLS(ITR) = CL	VIP.97
	CMS(ITR) = CM	VIP.98
	IF(ITR.LE.2) GO TO 101	VIP.99
	ERR = ABS(CLS(ITR)-CLS(ITR-1))/ABS(CLS(ITR))	VIP.100
	IF(ERR.LT.TOLL) ITRMAX = ITR	VIP.101
	IF(IPHIL.GT.ITRMAX) IPHIL = ITRMAX	VIP.102
101	CONTINUE	VIP.103
	NSIDE = 0	VIP.104
	WRITE(6,7000)	VIP.105
	WRITE(6,7400) MACH,ALPHA,SANGLE,ITR	VIP.106
	DO 60 N=1,NCMPT	VIP.107
	DO 50 NS=1,2	VIP.108
	NSIDE = NSIDE+1	VIP.109
	IMAX = NPP(NSIDE)	VIP.110
	WRITE(6,7100) N,NSIDE	VIP.111
	WRITE(6,7200)	VIP.112
	WRITE(6,7300)(XIP(NSIDE,I),ZIP(NSIDE,I),CPIP(NSIDE,I),SIGMA(NSIDE,I),I=1,IMAX)	VIP.113
		VIP.114
50	CONTINUE	VIP.115
60	CONTINUE	VIP.116
	WRITE(6,7500)	VIP.117
	WRITE(6,7900)	VIP.118
	WRITE(6,8000) (N,CLX(N),CMX(N),N=1,NCMPT)	VIP.119
	WRITE(6,7500)	VIP.120
	NSIDE=0	VIP.121
	NSEG=NCMPT	VIP.122
	NF=NFLAP	VIP.123
	GO TO(1,2,3,4),NSEG	VIP.124
1	KSEG = NSEG + 1	VIP.125
	GO TO 5	VIP.126
2	KSEG = NSEG + 2	VIP.127
	IF(NFLAP.EQ.1) KSEG = 3	VIP.128
	GO TO 5	VIP.129
3	KSEG = NSEG + 3	VIP.130
	IF(NFLAP.EQ.1) KSEG = 5	VIP.131
	IF(NFLAP.EQ.2) KSEG = 3	VIP.132
	GO TO 5	VIP.133
4	KSEG = NSEG + 1	VIP.134
5	CONTINUE	VIP.135
	LSEG=KSEG	VIP.136
C		VIP.137

C CALCULATE BOUNDARY LAYER DEVELOPMENT ON ALL LOWER SURFACES AND
 C UPPER SURFACES OF SLAT AND MAIN WING

6	IF(LSEG) 8,8,7	VIP.138
7	CONTINUE	VIP.139
	NBL = 200	VIP.140
	NSIDE=NSIDE+1	VIP.141
	IF(NF.EQ.0) GO TO 14	VIP.142
	IF(NSIDE.EQ.KSEG) NSIDE=NSIDE+1	VIP.143
	IF(NSIDE.LE.3) GO TO 16	VIP.144
	IF(NSEG.GE.3.AND.NFLAP.EQ.2) GO TO 15	VIP.145
	GO TO 16	VIP.146
15	CONTINUE	VIP.147
	IF(NCMPT.EQ.3.AND.NSIDE.EQ.6) GO TO 16	VIP.148
	IF(NCMPT.EQ.4.AND.NSIDE.EQ.4) GO TO 16	VIP.149
	IF(NSIDE.EQ.8) GO TO 16	VIP.150
	KSEG = KSEG + 2	VIP.151
	LSEG = LSEG + 1	VIP.152
16	CONTINUE	VIP.153
14	CONTINUE	VIP.154
	NPT=NPP(NSIDE)	VIP.155
	DO 200 N=1,NPT	VIP.156
	XIN(N)=XIP(NSIDE,N)	VIP.157
	ZIN(N)=ZIP(NSIDE,N)	VIP.158
	CPIN(N)=CPIP(NSIDE,N)	VIP.159
200	CONTINUE	VIP.160
	CALL OVERLAY(FRIS,2,0)	VIP.161
C	CALCULATE SOURCE DISTRIBUTION FOR EACH SEGMENT	VIP.162
	LLL = 2*(NCMPT-NFLAP)-1	VIP.163
	IF(NSIDE.EQ.LLL) GO TO 12	VIP.164
	GO TO 13	VIP.165
12	CONTINUE	VIP.166
	IF(H(NBL).GT.2.5) NBL=NBL-2	VIP.167
	CFI = CFI(NBL)	VIP.168
	H1 = H(NBL)	VIP.169
	THETA1 = TH1(NBL)	VIP.170
	UTE = U(NBL)	VIP.171
13	CONTINUE	VIP.172
	CALL SOURCE	VIP.173
	IF(NCMPT.EQ.2.AND.NFLAP.EQ.0.AND.NSIDE.EQ.4) CDS(ITR) = CDI+CDT	VIP.174
	IF(NCMPT.EQ.1.AND.NSIDE.EQ.2) CDS(ITR) = CDI+CDT	VIP.175
	CDI = CDT	VIP.176
	LSEG=LSEG-1	VIP.177
	GO TO 6	VIP.178
8	CONTINUE	VIP.179
	IF(NSEG.GE.3.AND.NFLAP.EQ.2) KSEG = KSEG - 2	VIP.180
C		VIP.181
C	CALCULATE FLAP BOUNDARY LAYER DEVELOPMENT	VIP.182
C		VIP.183
	NSIDE = KSEG	VIP.184
	REWIND 3	VIP.185
9	IF(NF) 11,11,10	VIP.186
10	CONTINUE	VIP.187
	NPT=NPP(NSIDE)	VIP.188
	DO 300 N=1,NPT	VIP.189
	XIN(N)=XIP(NSIDE,N)	VIP.190
	ZIN(N)=ZIP(NSIDE,N)	VIP.191
300	CPIN(N)=CPIP(NSIDE,N)	VIP.192
	MTRAN = 2	VIP.193
	WRITE(6,8100)	VIP.194
	CALL OVERLAY(FRIS,2,0)	VIP.195
	MTRAN = 2	VIP.196
	TRIP = SUD(ITRAN)	VIP.197
	CALL OVERLAY(FRIS,4,0)	VIP.198
	CALL OVERLAY(FRIS,3,0)	VIP.199
	DO 20 I=1,200	VIP.200
	SUD(I) = SSS(I)	VIP.201
	UUD(I) = USD(I)	VIP.202
		VIP.203
		VIP.204
		VIP.205

20	CONTINUE	VIP.206
	CALL SOURCE	VIP.207
	NF=NF-1	VIP.208
	NSIDE = NSIDE + 2	VIP.209
	GO TO 9	VIP.210
11	CONTINUE	VIP.211
	IF(NFLAP.GT.0) CDS(ITR) = CDT + CDI	VIP.212
	REWIND 3	VIP.213
	MTRAN = 1	VIP.214
C		VIP.215
	IF(ITR-ITRMAX) 900,1000,1000	VIP.216
900	ITR = ITR + 1	VIP.217
	GO TO 100	VIP.218
1000	CONTINUE	VIP.219
	WRITE(6,7500)	VIP.220
	WRITE(6,7600)	VIP.221
	WRITE(6,7700)	VIP.222
	WRITE(6,7800) (ITR,CLS(ITR),CMS(ITR),CDS(ITR), ITR=1,ITRMAX)	VIP.223
	WRITE(6,7500)	VIP.224
	ITRMAX = KAMAX	VIP.225
	NANGLE = NANGLE+1	VIP.226
	ITR = 1	VIP.227
	MCASE = MCASE-1	VIP.228
	IF(MCASE.GT.0) GO TO 100	VIP.229
	CALL EXIT	VIP.230
600	FORMAT(1H ,10F10.5)	VIP.231
601	FORMAT(1H ,3I5)	VIP.232
5000	FORMAT(8F10.0)	VIP.233
5200	FORMAT(8A10)	VIP.234
7000	FORMAT(1H0,20X,*AIRFOIL GEOMETRY AND SURFACE PRESSURE DISTRIBUTION	VIP.235
	IS*/)	VIP.236
7100	FORMAT(1H0,20X,*COMPONENT =*,13,5X,*SURFACE =*,13/)	VIP.237
7200	FORMAT(1H0,20X,*X INPUT* 15X *Z INPUT* 10X *PRESSURE COEFFICIENT*	VIP.238
	1 10X *SOURCE STRENGTH*/)	VIP.239
7300	FORMAT(1H ,18X,F10.5,13X,F10.5,10X,F10.5,20X,F10.5)	VIP.240
7400	FORMAT(1H0,20X,*MACH NO. =*,F10.5,5X,*ANGLE OF ATTACK =*,F10.5,	VIP.241
	1 5X,*SWEEP ANGLE =*,F10.5,5X,*ITERATION =*,13/)	VIP.242
7500	FORMAT(1H0/1H0,15X,100(1H*)//)	VIP.243
7600	FORMAT(1H0,20X,*LIFT DRAG AND MOMENT SUMMARY TABLE*/)	VIP.244
7700	FORMAT(1H0,22X,*ITERATION* 13X *LIFT COEFFICIENT* 10X *MOMENTUM CO	VIP.245
	EFFICIENT* 12X *DRAG COEFFICIENT*/)	VIP.246
7800	FORMAT(1H0,22X,15,18X,F10.5,18X,F10.5,18X,F10.5)	VIP.247
7900	FORMAT(1H0,20X,*COMPONENT* 10X *LIFT COEFFICIENT* 10X *MOMENTUM CO	VIP.248
	EFFICIENT*/)	VIP.249
8000	FORMAT(1H0,18X,15,18X,F10.5,18X,F10.5)	VIP.250
8100	FORMAT(1H0,20X,*BOUNDARY LAYER DEVELOPMENT ON FLAP UPPER SURFACE	VIP.251
	1IN SLOT REGION*)	VIP.252
	END	VIP.253

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

	SUBROUTINE SOURCE	SOURCE.2
	COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),	SOURCE.3
	ICF2(200),DEL(200),DELST2(200),DELT(200),H(200),HHOS(200),H1(200),	SOURCE.4
	2PK(200),RDEL(200),RINST2(200),RTRAN(200),PKBAR(200),RTH(200),	SOURCE.5
	3S(200),U(200),DU(200),SJD(200),UUD(200),THET12(200),THET21(200),	SOURCE.6
	4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),	SOURCE.7
	5XIP(8,100),ZIP(8,100),CPIP(8,100),NPP(8),DUMMY(192)	SOURCE.8
	COMMON /SIG/ SIG(200),SIGMAD(200),SIGMA(8,100)	SOURCE.9
	COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)	SOURCE.10
	COMMON/NPT/NPT	SOURCE.11
	COMMON/NBL/ NBL	SOURCE.12
	COMMON/ITR/ITR,ITRMAX	SOURCE.13
	COMMON/NUS/NUS	SOURCE.14
	COMMON /NSIDE/ NSIDE	SOURCE.15
	COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),TE(4)	SOURCE.16
	FACTOR = ITR-1	SOURCE.17
	SIGNPT = .115-.01*FACTOR	SOURCE.18
	IF(NFLAP.GT.0) SIGNPT = .15	SOURCE.19
	DO 5 I=1,NUS	SOURCE.20
	IF(H(I).GE.3.) H(I) = 3.	SOURCE.21
5	CONTINUE	SOURCE.22
	DO 10 I = 1,NUS	SOURCE.23
	SIG(I) = H(I)*THT(I)*UUD(I)	SOURCE.24
10	CONTINUE	SOURCE.25
	CALL DCPDX(SIG,SUD,SIGMAD,NUS)	SOURCE.26
	K=NSIDE	SOURCE.27
	B = SIGNPT	SOURCE.28
	C = -SIGNPT	SOURCE.29
	DO 20 I = 1,NPT	SOURCE.30
	SIGMA(K,I) = TBLU1(SU(I),SUD,SIGMAD,1,NUS)	SOURCE.31
	IF(SIGMA(K,I).GE.B) GO TO 70	SOURCE.32
	IF(SIGMA(K,I).LE.C) GO TO 60	SOURCE.33
20	CONTINUE	SOURCE.34
	GO TO 50	SOURCE.35
60	CONTINUE	SOURCE.36
	SIGNPT = C	SOURCE.37
70	CONTINUE	SOURCE.38
	IS = I - 1	SOURCE.39
	IF(I.EQ.1) IS = 1	SOURCE.40
	SLOPE = (SIGNPT - SIGMA(K,IS))/(SU(NPT) - SU(IS))	SOURCE.41
	ISS = IS + 1	SOURCE.42
	DO 40 I = ISS,NPT	SOURCE.43
	SIGMA(K,I) = SIGMA(K,IS) + SLOPE*(SU(I) - SU(IS))	SOURCE.44
40	CONTINUE	SOURCE.45
	IF(NCMPT.EQ.1.OR.NFLAP.EQ.0) GO TO 50	SOURCE.46
	MAIN = NCMPT-NFLAP	SOURCE.47
	KK = MAIN + MAIN	SOURCE.48
	IF(NFLAP.EQ.2.AND.NFP.EQ.1) KK = KK + 2	SOURCE.49
	IF(K.NE.KK) GO TO 50	SOURCE.50
	SS = SUD(NBL)	SOURCE.51
	DO 30 I=1,NPT	SOURCE.52
	IF(SU(I).GE.SS) GO TO 90	SOURCE.53
30	CONTINUE	SOURCE.54
90	CONTINUE	SOURCE.55
	ISS = I+3	SOURCE.56
	IT = I+2	SOURCE.57
	IF(ISS.GE.NPT) GO TO 50	SOURCE.58
	SIGMA(K,I+1) = SIGMA(K,I)	SOURCE.59
	SIGMA(K,I+2) = SIGMA(K,I)	SOURCE.60
	SLOPE = -SIGMA(K,IT)/(SU(NPT)-SU(IT))	SOURCE.61
	DO 80 I=ISS,NPT	SOURCE.62
	SIGMA(K,I) = SIGMA(K,IT) + SLOPE*(SU(I)-SU(IT))	SOURCE.63
80	CONTINUE	SOURCE.64
50	CONTINUE	SOURCE.65
	RETURN	SOURCE.66
	END	SOURCE.67

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SUBROUTINE DCPDX(U,X,DU,N)
DIMENSION U(1),X(1),DU(1)
DO 10 I = 1,N
IF(I.GT.1) GO TO 1
DX1 = X(I+1) - X(I)
DX2 = X(I+2) - X(I+1)
DX = DX1 + DX2
DU1 = U(I+1) - U(I)
DU2 = U(I+2) - U(I+1)
A = DU1*(DX2/DX1 + 2.)
B = DU2*(DX1/DX2)
DU(I) = (A-B)/DX
GO TO 10
1 IF(I.EQ.N) GO TO 2
DX1 = X(I) - X(I-1)
DX2 = X(I+1) - X(I)
DX = DX1 + DX2
DU1 = U(I) - U(I-1)
DU2 = U(I+1) - U(I)
A = DU2*DX1/DX2
B = DU1*DX2/DX1
DU(I) = (A+B)/DX
GO TO 10
2 CONTINUE
DX1 = X(I-1) - X(I-2)
DX2 = X(I) - X(I-1)
DX = DX1 + DX2
DU1 = U(I-1) - U(I-2)
DU2 = U(I) - U(I-1)
A = DU2*(DX1/DX2 + 2.)
B = DU1*(DX2/DX1)
DU(I) = (A-B)/DX
10 CONTINUE
RETURN
END

```

DCPDX.2
DCPDX.3
DCPDX.4
DCPDX.5
DCPDX.6
DCPDX.7
DCPDX.8
DCPDX.9
DCPDX.10
DCPDX.11
DCPDX.12
DCPDX.13
DCPDX.14
DCPDX.15
DCPDX.16
DCPDX.17
DCPDX.18
DCPDX.19
DCPDX.20
DCPDX.21
DCPDX.22
DCPDX.23
DCPDX.24
DCPDX.25
DCPDX.26
DCPDX.27
DCPDX.28
DCPDX.29
DCPDX.30
DCPDX.31
DCPDX.32
DCPDX.33
DCPDX.34
DCPDX.35
DCPDX.36

```

INTEGER FUNCTION INSERT(Z,X,ND,M,IS)
DIMENSION X(1)
IHALF(I) = (I + 1)/2
N=IABS(M)
INSERT = 1
I=1
IF(N.LE.1) GO TO 24
ND=MINO(ND,N-1)
IF(M .GE. 0) GO TO 445
IF(ABS(Z+Z-X(1)-X(N)) .LE. ABS(X(1)-X(N))) GO TO 445
IF(X(N).GT.X(1).AND.Z.GT.X(N)) I=N
IF(X(N).LT.X(1).AND.Z.LT.X(N)) I=N
GO TO 24
445 IGO=1
IF(X(1) .GT. X(2)) IGO=0
I=IHALF(N)
IDLT=I
5 IDLT=IHALF(IDLT)
DIF=X(1)-Z
IF(IGO.EQ.0) DIF=-DIF
IF(DIF) 30,24,20
24 IS=I
GO TO 52
20 IF(I-1) 40,40,21
21 IF(I-IDLT) 22,22,23
22 IDLT=IHALF(IDLT)
23 I=I-IDLT
I=MAX0(I,1)
GO TO 5
30 IF(I-N) 31,40,40

```

INSERT.2
INSERT.3
INSERT.4
INSERT.5
INSERT.6
INSERT.7
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INSERT.28
INSERT.29
INSERT.30
INSERT.31

31	DIF=X(I+1)-Z	INSERT.32
	IF(IGO.EQ.0) DIF=-DIF	INSERT.33
	IF(DIF) 34,35,40	INSERT.34
36	IS=I+1	INSERT.35
	GO TO 52	INSERT.36
34	I=I-IDLT	INSERT.37
	IF(I-N) 5,5,35	INSERT.38
35	I=I-IDLT	INSERT.39
	IDLT=IHAF(IIDLT)	INSERT.40
	GO TO 34	INSERT.41
40	IF(ND) 44,44,43	INSERT.42
44	IF(I.EQ.N) GO TO 24	INSERT.43
	IF(ABS(Z-X(I)) .LE. ABS(Z-X(I+1))) GO TO 24	INSERT.44
	GO TO 36	INSERT.45
43	I=MINO(MAXO(1,I-(ND-1)/2), N-ND)	INSERT.46
	IS=I	INSERT.47
	INSERT = 0	INSERT.48
52	RETURN	INSERT.49
	END	INSERT.50
	SUBROUTINE SMLN(XC,CC,B,N)	SMLN.2
	DIMENSION XC(4,4), B(4), CC(4)	SMLN.3
C	ROUTINE TO SOLVE A SET OF LINEAR SIMULTANEOUS EQUATIONS.	SMLN.4
	NP = N+1	SMLN.5
	NM = N-1	SMLN.6
C	TRIANGULARIZATION	SMLN.7
	DO 100 K=1,NM	SMLN.8
	KP = K+1	SMLN.9
	R = 1./XC(K,K)	SMLN.10
	DO 50 J=KP,N	SMLN.11
50	XC(K,J)=R*XC(K,J)	SMLN.12
	B(K) = R*B(K)	SMLN.13
	DO 100 I=KP,N	SMLN.14
	S = XC(I,K)	SMLN.15
	B(I) = B(I)-S*B(K)	SMLN.16
	DO 100 J=KP,N	SMLN.17
	XC(I,J)=XC(I,J)-S*XC(K,J)	SMLN.18
100	CONTINUE	SMLN.19
C	BACK SUBSTITUTION.	SMLN.20
	CC(N) = B(N)/XC(N,N)	SMLN.21
	DO 200 I=1,NM	SMLN.22
	K = N-I	SMLN.23
	KP = K+1	SMLN.24
	S = B(K)	SMLN.25
	DO 150 J=KP,N	SMLN.26
	S = S-XC(K,J)*CC(J)	SMLN.27
150	CONTINUE	SMLN.28
	CC(K)= S	SMLN.29
200	CONTINUE	SMLN.30
	RETURN	SMLN.31
	END	SMLN.32
	FUNCTION TBLU1(XX,X,Y,MD,N)	TBLU1.2
	DIMENSION X(1), Y(1)	TBLU1.3
	ND=MD	TBLU1.4
	IF(INSERT(XX,X,ND,N,I) .EQ. 0) GO TO 43	TBLU1.5
	TBLU1=Y(I)	TBLU1.6
	GO TO 51	TBLU1.7
43	CONTINUE	TBLU1.8
	M=I+ND	TBLU1.9
	TERP1=0.	TBLU1.10
	DO 50 J=I,M	TBLU1.11
	PX=1.	TBLU1.12
	DO 42 K=I,M	TBLU1.13
	IF(K .EQ. J) GO TO 42	TBLU1.14
	PX=(PX/(X(J)-X(K)))*(XX-X(K))	TBLU1.15
42	CONTINUE	TBLU1.16
50	TERP1=TERP1+PX*Y(J)	TBLU1.17
	TBLU1=TERP1	TBLU1.18
51	RETURN	TBLU1.19
	END	TBLU1.20

<pre> OVERLAY(FRIS,1,0) PROGRAM POTFLOW COMMON/ ANGLE / ANGLE COMMON/ NPT / NPT COMMON /ITR/ ITR,ITRMAX COMMON /JMAX/ JMAX COMMON/NANGLE/NANGLE COMMON /XIN/ XIN(100),ZIN(100),CPIN(100) COMMON /PARAM/ MACH,ALPHA,REFA,MATIN COMMON /VELCOM/ NPOINT,NPART,IMAX,EX,PRINT COMMON/POINT/ARRAY(4950) COMMON/GAMM/GA(600),Q COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(12),NPU(4),NPL(4),ISTG(4) 1,UCU(4),UCL(4),WCU(4),WCL(4),XTE(4),ZTE(4),DELZ(3),NG(3),NPG(4) 2,THKTE(4) COMMON /SCRAT/ SINBD(600),COSBD(600),TANBD(600),UL(600),WL(600), 1UCJ(2),WCJ(2),ULJ(2),WLJ(2),UC(600),WC(600),AC(600),AS(100) 2,H(100),DUM(10192) COMMON/GAP/ ZGAP(2),SXU(2) COMMON/CURVES/ R(30,2) COMMON/XGEM/ IGEM COMMON/XSOLVE/ ISOLVE DIMENSION DELTA(600),THET(600),CHORD(600),XPT(600),ZPT(600), 1XU(30,4),ZU(30,4),XL(30,4),ZL(30,4),XCOR(600),ZCOR(600), 2XGRID(30,3),ZGRID(30,3),DZDX(30,3),Q(600) EQUIVALENCE (ARRAY,DELTA),(ARRAY(601),THET),(ARRAY(1201),CHORD), 1(ARRAY(1801),XPT),(ARRAY(2401),ZPT), 2(ARRAY(3001),XU),(ARRAY(3121),XL), 3(ARRAY(3241),ZU),(ARRAY(3361),ZL), 4(ARRAY(3481),XGRID),(ARRAY(3571),ZGRID),(ARRAY(3661),DZDX), 5(ARRAY(3751),XCOR),(ARRAY(4351),ZCOR) DATA FRIS/4HFRIS/ REAL MACH EPS=1.0E-6 KTE = 0 EM=-1.0 PI=3.14159265 REFA=1.0 REWIND 3 REWIND 7 REWIND 8 REWIND 9 REWIND 10 IF (ITR.EQ.1.AND.NANGLE.GT.1) GO TO 45 IF (ITR.GT.2) GO TO 350 IF (ITR.GT.1) GO TO 11 5 CONTINUE NPASS=0 CALL ROTATE(XU,ZU,XL,ZL) IF (IGEM.GE.1) STOP 7000 NF=0 NP=0 NX = NCMPT - NFLAP DO 12 N=1,NCMPT IF (N.LE.NX) NPG(N) = 0 IF (N.LE.NX) GO TO 12 NF=NF+1 LPL = NPL(N-1) XTE(NF) = XL(LPL,N-1) ZTE(NF) = ZL(LPL,N-1) 12 CONTINUE IF (NFLAP.EQ.0) GO TO 21 DO 22 NX=1,NFLAP N = NCMPT-NFLAP+NX LPU = NPU(N) DO 23 L=1,LPU H(L) = SQRT((XTE(NX)-XU(L,N))**2 + (ZTE(NX)-ZU(L,N))**2) IF (L.EQ.1) GO TO 23 IF (H(L).LE.H(L-1)) GO TO 23 IF (H(L).LE.H(L-2)) GO TO 24 KGAP = L-1 </pre>	<p>REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR</p>	<pre> POTFLOW.3 POTFLOW.4 POTFLOW.5 POTFLOW.6 POTFLOW.7 POTFLOW.8 POTFLOW.9 POTFLOW.10 POTFLOW.11 POTFLOW.12 POTFLOW.13 POTFLOW.14 POTFLOW.15 POTFLOW.16 POTFLOW.17 POTFLOW.18 POTFLOW.19 POTFLOW.20 POTFLOW.21 POTFLOW.22 POTFLOW.23 POTFLOW.24 POTFLOW.25 POTFLOW.26 POTFLOW.27 POTFLOW.28 POTFLOW.29 POTFLOW.30 POTFLOW.31 POTFLOW.32 POTFLOW.33 POTFLOW.34 POTFLOW.35 POTFLOW.36 POTFLOW.37 POTFLOW.38 POTFLOW.39 POTFLOW.40 POTFLOW.41 POTFLOW.42 POTFLOW.43 POTFLOW.44 POTFLOW.45 POTFLOW.46 POTFLOW.47 POTFLOW.48 POTFLOW.49 POTFLOW.50 POTFLOW.51 POTFLOW.52 POTFLOW.53 POTFLOW.54 POTFLOW.55 POTFLOW.56 POTFLOW.57 POTFLOW.58 POTFLOW.59 POTFLOW.60 POTFLOW.61 POTFLOW.62 POTFLOW.63 POTFLOW.64 POTFLOW.65 POTFLOW.66 POTFLOW.67 POTFLOW.68 POTFLOW.69 POTFLOW.70 POTFLOW.71 POTFLOW.72 </pre>
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	GO TO 25	POTFLOW.73
24	CONTINUE	POTFLOW.74
	KGAP = L	POTFLOW.75
	GO TO 25	POTFLOW.76
23	CONTINUE	POTFLOW.77
25	CONTINUE	POTFLOW.78
	H1 = H(KGAP-1)	POTFLOW.79
	H2 = H(KGAP)	POTFLOW.80
	H3 = SQRT((XU(KGAP,N)-XU(KGAP-1,N))**2 + (ZU(KGAP,N)-ZU(KGAP-1,N))	POTFLOW.81
	1**2)	POTFLOW.82
	SA = (H1**2 - H2**2 + H3**2)/2.*H3	POTFLOW.83
	ZGAP(NX) = SQRT(H1**2 - SA**2)	POTFLOW.84
	IF(SA.LT.0.) KGAP = KGAP-1	POTFLOW.85
	NPG(N) = KGAP	POTFLOW.86
	SXU(NX) = SA	POTFLOW.87
22	CONTINUE	POTFLOW.88
21	CONTINUE	POTFLOW.89
	NF = 0	POTFLOW.90
	DO 40 N=1,NCMPT	POTFLOW.91
	IF(N.EQ.1.OR.NPG(N).EQ.0) GO TO 26	POTFLOW.92
	NF = NF + 1	POTFLOW.93
26	CONTINUE	POTFLOW.94
	DO 30 NSIDE=1,2	POTFLOW.95
	IF(NSIDE.EQ.1) NL=NPU(N)-1	POTFLOW.96
	IF(NSIDE.EQ.2) NL=NPL(N)-1	POTFLOW.97
	DO 20 L=1,NL	POTFLOW.98
	NP=NP+1	POTFLOW.99
	IF(NSIDE.EQ.2) GO TO 15	POTFLOW.100
	XPT(NP)=(XU(L+1,N)+XU(L,N))/2.	POTFLOW.101
	ZPT(NP)=(ZU(L+1,N)+ZU(L,N))/2.	POTFLOW.102
	XC=XU(L+1,N)-XU(L,N)	POTFLOW.103
	ZC=ZU(L+1,N)-ZU(L,N)	POTFLOW.104
	XCOR(NP)=XU(L,N)	POTFLOW.105
	ZCOR(NP)=ZU(L,N)	POTFLOW.106
	GO TO 18	POTFLOW.107
15	CONTINUE	POTFLOW.108
	XPT(NP)=(XL(L+1,N)+XL(L,N))/2.	POTFLOW.109
	ZPT(NP)=(ZL(L+1,N)+ZL(L,N))/2.	POTFLOW.110
	XC=XL(L+1,N)-XL(L,N)	POTFLOW.111
	ZC=ZL(L+1,N)-ZL(L,N)	POTFLOW.112
	XCOR(NP)=XL(L+1,N)	POTFLOW.113
	ZCOR(NP)=ZL(L+1,N)	POTFLOW.114
18	CHORD(NP)=SQRT(XC*XC+ZC*ZC)	POTFLOW.115
	Q(NP) = 0.	POTFLOW.116
	THET(NP)=0.	POTFLOW.117
	DELTA(NP)=0.	POTFLOW.118
	IF(ZC.NE.0.) DELTA(NP)=ATAN2(ZC,XC)	POTFLOW.119
	IF(L.LT.NL) GO TO 19	POTFLOW.120
	IF(NSIDE.EQ.1) TU=DELTA(NP)	POTFLOW.121
	IF(NSIDE.EQ.2) TL=DELTA(NP)	POTFLOW.122
	LUP = NPU(N)	POTFLOW.123
	IF(NSIDE.EQ.1) ZTEU=ZU(LUP,N)	POTFLOW.124
	LUL = NPL(N)	POTFLOW.125
	IF(NSIDE.EQ.2) ZTEL=ZL(LUL,N)	POTFLOW.126
19	IF(NSIDE.EQ.2.OR.NPG(N).EQ.0) GO TO 20	POTFLOW.127
	LG=L+1-NPG(N)	POTFLOW.128
	IF(L.EQ.NL) NG(NF) = LG + 1	POTFLOW.129
	IF(LG.LT.1) GO TO 20	POTFLOW.130
	XGRID(LG,NF)=XU(L,N)	POTFLOW.131
	ZGRID(LG,NF)=ZU(L,N)	POTFLOW.132
	DZDX(LG,NF)=ZC/XC	POTFLOW.133
	IF(L.LT.NL) GO TO 20	POTFLOW.134
	LL = NPU(N)	POTFLOW.135
	XGRID(LG+1,NF) = XU(LL,N)	POTFLOW.136
	ZGRID(LG+1,NF) = ZU(LL,N)	POTFLOW.137
	DZDX(LG+1,NF) = DZDX(LG,NF)	POTFLOW.138
20	CONTINUE	POTFLOW.139
30	CONTINUE	POTFLOW.140
	THETE(N)=TL-TU	POTFLOW.141

```

THKTE(N)=ZTEU-ZTEL
IF (ABS(THKTE(N)).LE.EPS) THKTE(N)=0.
40 CONTINUE
WRITE(7) ARRAY
REWIND 7
NPOINT=NP
45 READ(5,501) MACH,ALPHA
GO TO 13
11 CONTINUE
DO 1 N =1,NCMPT
IF (THKTE(N).GT.0.) KTE = 1
1 CONTINUE
IF (KTE.EQ.0) GO TO 350
IF (ITR.GT.1) READ(7) ARRAY
REWIND 7
13 CONTINUE
ANGLE=ALPHA
IF (MACH.LT.0.) RETURN
IF (MACH.EQ.EM) GO TO 325
EM=MACH
MATIN=0
IF (ITR.EQ.1.AND.ANGLE.GT.1) READ(7) ARRAY
REWIND 7
NPASS=NPASS+1
BT2=1.-MACH*MACH
BETA=SQRT(BT2)
CON=1./(2.*PI)
BCON=BETA*CON
DO 50 N=1,NPOINT
BD=BETA*TAN(DELTA(N))
TANBD(N)=BD
COSBD(N)=1./SQRT(1.+BD*BD)
50 SINBD(N)=BD*COSBD(N)
DO 300 I=1,NPOINT
XI=XPT(I)
ZI=ZPT(I)
DI=TANBD(I)
OB=DI/BT2
I2=0
J=0
JMAX=0
JL=0
JT=0
K=0
DO 275 N=1,NCMPT
JL=JT+1
JT=JT+NC(N)-2
JMAX=JMAX+NC(N)
I1=I2+1
I2=I1-3*NC(N)
IT=I1+NPU(N)-2
IL=IT+1
UCJT=0.
WCJT=0.
ACJT=0.
DO 250 NSIDE=1,2
IF (NSIDE.EQ.1) NL=NPU(N)-1
IF (NSIDE.EQ.2) NL=NPL(N)-1
NL1=NL+1
DO 225 L=1,NL
J=J+1
K=K+1
IF (I.GT.1) GO TO 58
IF (NSIDE.EQ.2) GO TO 55
XC=XU(L+1,N)-XU(IL,N)
ZC=ZU(L+1,N)-ZU(IL,N)
GO TO 56
55 XC=XL(L+1,N)-XL(IL,N)
ZC=ZL(L+1,N)-ZL(IL,N)

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POTFLOW.142
POTFLOW.143
POTFLOW.144
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POTFLOW.146
POTFLOW.147
POTFLOW.148
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POTFLOW.209
POTFLOW.210

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56 CHORD(K)=SQRT(XC*XC+BT2*ZC*ZC)
58 DO 100 M=1,2
    LI=L+M-1
    IF(INSIDE.EQ.2) GO TO 60
    DX=XI-XU(LI,N)
    DZ=(ZI-ZU(LI,N))*BETA
    GO TO 80
60 DX=XI-XL(LI,N)
    DZ=(ZI-ZL(LI,N))*BETA
80 XPM=DX*COSBD(K)+DZ*SINBD(K)
    ZPM=DZ*COSBD(K)-DX*SINBD(K)
    IF(ABS(XPM).LE.EPS) XPM=0.
    IF(ABS(ZPM).LE.EPS) ZPM=0.
    RPM2=XPM*XPM+ZPM*ZPM
    RPM=0.
    IF(RPM2.GT.0.) RPM=SQRT(RPM2)
    G=0.
    IF(RPM.GT.0.) G=ALOG(RPM)
    F=PI/2.
    IF(XPM.EQ.0..AND.ZPM.EQ.0.) GO TO 90
    F=ATAN2(ZPM,XPM)
90 CONTINUE
    IF(INSIDE.EQ.2..AND.ZPM.EQ.0.) F=-F
    UCJ(M)=-F
    WCJ(M)=-G
    ULJ(M)=- (XPM*F+ZPM*G)/CHORD(K)
    WLJ(M)= (ZPM*F+XPM*(1.-G))/CHORD(K)
100 CONTINUE
    UCPM=UCJ(1)-ULJ(1)+ULJ(2)
    WCPM=WCJ(1)-WLJ(1)+WLJ(2)
    ULPM=ULJ(1)-ULJ(2)-UCJ(2)
    WLPM=WLJ(1)-WLJ(2)-WCJ(2)
    USPM=WCJ(2)-WCJ(1)
    WSPM=UCJ(1)-UCJ(2)
    UC(J)=(UCPM*COSBD(K)-WCPM*SINBD(K))*CON
    WC(J)=(WCPM*COSBD(K)+UCPM*SINBD(K))*8CON
    UL(J)=(ULPM*COSBD(K)-WLPM*SINBD(K))*CON
    WL(J)=(WLPM*COSBD(K)+ULPM*SINBD(K))*8CON
    USJ=(USPM*COSBD(K)-WSPM*SINBD(K))*8CON
    WSJ=(WSPM*COSBD(K)+USPM*SINBD(K))*CON
    UCJT=UCJT+USJ
    WCJT=WCJT+WSJ
    ACJT=ACJT+WSJ-DB*USJ
    IF(INSIDE.EQ.2..AND.L.EQ.1) GO TO 160
    IF(L.GT.1) UC(J)=UC(J)+UL(J-1)
    IF(L.GT.1) WC(J)=WC(J)+WL(J-1)
    GO TO 200
160 AS(L)=UC(J)+DB*WC(J)
    UC(JL)=UC(JL)+UC(J)
    WC(JL)=WC(JL)+WC(J)
    AC(JL)=WC(JL)-DI*UC(JL)
    UL(J-1)=UL(J)
    WL(J-1)=WL(J)
    J=J-1
    GO TO 225
200 AC(J)=WC(J)-DI*UC(J)
    AS(L)=UC(J)+DB*WC(J)
    IF(L.LT.NL) GO TO 225
    IF(INSIDE.EQ.2) GO TO 220
    UCU(N)=UL(J)
    WCU(N)=WL(J)
    ACU=WCU(N)-DI*UCU(N)
    AS(NL1)=UCU(N)+DB*WCU(N)
    IF(I.LT.I1.OR.I.GT.IT) GO TO 215
    II=I-II+1
    DO 210 LL=1,NL
    IF(LL.NE.II) GO TO 210
    AS(LL)=-AS(LL)

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POTFLOW.211
POTFLOW.212
POTFLOW.213
PCTFLOW.214
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POTFLOW.277
POTFLOW.278

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      AS(LL+1)=-AS(LL+1)
210 CONTINUE
215 WRITE(1) ACU,(AS(LL),LL=1,NL1)
      GO TO 225
220 UCL(N)=UL(J)
      WCL(N)=WL(J)
      ACL=WCL(N)-D1*UCL(N)
      AS(NL1)=UCL(N)+D8*WCL(N)
      IF(1.LT.IL.OR.1.GT.I2) GO TO 224
      II=I-IL+1
      DO 222 LL=1,NL
      IF(LL.NE.II) GO TO 222
      AS(LL)=-AS(LL)
      AS(LL+1)=-AS(LL+1)
222 CONTINUE
224 WRITE(1) ACL,(AS(LL),LL=1,NL1)
225 CONTINUE
250 CONTINUE
      UC(JT)=UCJT
      WC(JT)=WCJT
      AC(JT)=ACJT
      IF(THKTE(N).EQ.0..OR.ITR.GT.1) GO TO 255
      UC(JT)=0.
      WC(JT)=0.
      AC(JT)=ACU-ACL
255 CONTINUE
      J=J+1
      IF(NCMPT.EQ.1.OR.ISOLVE.EQ.0) GO TO 275
      IF(1.LT.I1.OR.1.GT.I2) GO TO 275
      WRITE(3) (AC(II+I1-1),II=1,JT)
      DO 260 II=1,JT
260 AC(II+I1-1)=0.
275 CONTINUE
      J=0
      K=0
      DO 290 N=1,NCMPT
      J2=NC(N)
      J1=J2-1
      JT=J2-2
      DO 290 JJ=1,J2
      J=J+1
      IF(JJ.GT.JT) GO TO 285
      K=K+1
      UL(J)=UC(K)
      WL(J)=WC(K)
      GO TO 290
285 IF(JJ.EQ.J2) GO TO 286
      UL(J)=UCU(N)
      WL(J)=WCU(N)
      GO TO 290
286 UL(J)=UCL(N)
      WL(J)=WCL(N)
290 CONTINUE
      WRITE(8) (UL(J),WL(J),J=1,JMAX)
      WRITE(9) (AC(J),J=1,NPOINT)
300 CONTINUE
325 REWIND 8
      REWIND 9
      REWIND 1
      REWIND 3
350 IF(ITR.GE.2) READ(7) ARRAY
      REWIND 7
      CALL SOLVE
400 RETURN
500 FORMAT(14I5)
501 FORMAT(7F10.0)
601 FORMAT(1H,10F10.5)
660 FORMAT(7I5,9F10.5)
      END

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	SUBROUTINE ROTATE(XU,ZU,XL,ZL)	SAPR.111
	COMMON/DZDX/ DDX(30),DDZ(30),DS(30)	SAPR.112
	COMMON/XFND/ XFIND(20),NXFIND	SAPR.113
	COMMON/SCRAT/ XXS(30),ZXS(30),TS(30),XR(30),ZR(30),TEMP(30),	SAPR.114
	IRAD(30),XXU(30,4),ZZU(30,4),XXL(30,4),ZZL(30,4),XPW(3),XPC(3),	SAPR.115
	ZZPW(3),ZPC(3),DELF(3),XK(30),ZK(30),DUMMY(8035)	SAPR.116
	COMMON/SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(12),NPU(4),NPL(4),	SAPR.117
	IDUM(28),DELZ(3),DUMH(11)	SAPR.118
	COMMON/CURVES/ R(30,2)	SAPR.119
	DIMENSION XU(30,4),ZU(30,4),XL(30,4),ZL(30,4)	SAPR.120
	READ(5,500) NCMPT,NSLAT,NFLAP,(NPU(N),NPL(N),N=1,NCMPT)	SAPR.121
	NF = 0	SAPR.122
	DO 10 N = 1, NCMPT	SAPR.123
	LPU = NPU(N)	SAPR.124
	LPL = NPL(N)	SAPR.125
	NC(N) = LPU*LPL	SAPR.126
	READ(5,501) (XXU(L,N),L=1,LPU)	SAPR.127
	READ(5,501) (ZZU(L,N),L=1,LPU)	SAPR.128
	READ(5,501) (XXL(L,N),L=1,LPL)	SAPR.129
	READ(5,501) (ZZL(L,N),L=1,LPL)	SAPR.130
	NMM = NCMPT - NFLAP	SAPR.131
	IF(N,LE,NMM) GO TO 10	SAPR.132
	NF = NF + 1	SAPR.133
	DELZ(NF) = .005	SAPR.134
10	CONTINUE	SAPR.135
	IM = 1	SAPR.136
	NPIVOT = NCMPT - 1	SAPR.137
	IF(NPIVOT.EQ.0) GO TO 101	SAPR.138
C	PIVOT POINTS IN WING COORDINATES	SAPR.139
	READ(5,501) (XPW(N),ZPW(N),N=1,NPIVOT)	SAPR.140
C	PIVOT POINTS IN COMPONENT COORDINATES	SAPR.141
	READ(5,501) (XPC(N),ZPC(N),N=1,NPIVOT)	SAPR.142
C	FLAP DEFLECTIONS	SAPR.143
	READ(5,501) (DELF(N),N=1,NPIVOT)	SAPR.144
	N=1	SAPR.145
	NPIVOT = 1	SAPR.146
	IF(NSLAT.EQ.0) N=2	SAPR.147
102	CONTINUE	SAPR.148
	IF(N.EQ.2) IM=1	SAPR.149
	IF(NSLAT.EQ.1) IM=2	SAPR.150
	I = NPIVOT	SAPR.151
	DX = XPW(I) - XPC(I)	SAPR.152
	DZ = ZPW(I) - ZPC(I)	SAPR.153
	TH = DELF(I)/57.2957795	SAPR.154
	DO 104 NSIDE = 1,2	SAPR.155
	IF(NSIDE.EQ.1) NL = NPU(N)	SAPR.156
	IF(NSIDE.EQ.2) NL = NPL(N)	SAPR.157
	DO 103 L=1,NL	SAPR.158
	IF(NSIDE.EQ.2) GO TO 105	SAPR.159
	XPP = XXU(L,N)	SAPR.160
	ZPP = ZZU(L,N)	SAPR.161
	GO TO 106	SAPR.162
105	CONTINUE	SAPR.163
	XPP = XXL(L,N)	SAPR.164
	ZPP = ZZL(L,N)	SAPR.165
106	CONTINUE	SAPR.166
	CALL ROTAN(XPP,ZPP,TH,XPC(I),ZPC(I),DX,DZ,XX,ZZ)	SAPR.167
	IF(NSIDE.EQ.2) GO TO 107	SAPR.168
	XU(L,N) = XX	SAPR.169
	ZU(L,N) = ZZ	SAPR.170
	GO TO 108	SAPR.171
107	CONTINUE	SAPR.172
	XL(L,N) = XX	SAPR.173
	ZL(L,N) = ZZ	SAPR.174
108	CONTINUE	SAPR.175
103	CONTINUE	SAPR.176
104	CONTINUE	SAPR.177
	IF(N.EQ.1.AND.NSLAT.EQ.1) N=N+1	SAPR.178
	N = N+1	SAPR.179

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NPIVOT = NPIVOT + 1
IF(N.GT.NCMPT) GO TO 101
GO TO 102
101 CONTINUE
N = IM
DO 110 NSIDE = 1,2
IF(NSIDE.EQ.1) NL = NPU(N)
IF(NSIDE.EQ.2) NL = NPL(N)
DO 109 L = 1,NL
IF(NSIDE.EQ.2) GO TO 111
XU(L,N) = XXU(L,N)
ZU(L,N) = ZZU(L,N)
GO TO 112
111 CONTINUE
XL(L,N) = XXL(L,N)
ZL(L,N) = ZZL(L,N)
112 CONTINUE
109 CONTINUE
110 CONTINUE
WRITE(6,602)
DO 113 N = 1,NCMPT
WRITE(6,603) N
LPU = NPU(N)
LPL = NPL(N)
WRITE(6,604)
WRITE(6,606)
WRITE(6,608)
WRITE(6,607) (XXU(L,N),ZZU(L,N),XU(L,N),ZU(L,N),L=1,LPU)
WRITE(6,605)
WRITE(6,606)
WRITE(6,608)
WRITE(6,607) (XXL(L,N),ZZL(L,N),XL(L,N),ZL(L,N),L=1,LPL)
113 CONTINUE
IF(NFLAP.EQ.0) GO TO 120
READ(5,501) SIGMA
DO 114 NX = 1,NFLAP
N = NCMPT - NFLAP + NX
LPU = NPU(N)
SLP1 = 0.
SLPN = 0.
DO 116 L = 1,LPU
XK(L) = XU(L,N)
ZK(L) = ZU(L,N)
TEMP(L) = XXU(L,N)
116 CONTINUE
IF(NXFIND.EQ.0) GO TO 121
IF(NX.GT.1) GO TO 121
DO 119 I = 1,NXFIND
XFIND(I) = TBLU1(XFIND(I),TEMP,XK,1,LPU)
119 CONTINUE
WRITE(6,601) (XFIND(I),I=1,NXFIND)
121 CONTINUE
CALL KURV1(LPU,XK,ZK,SLP1,SLPN,XR,ZR,TEMP,S,SIGMA)
T = 0.
DO 117 L = 1,LPU
CALL KURV2(T,XS,ZS,LPU,XK,ZK,XR,ZR,S,SIGMA)
T = -T
XXS(L) = XS
ZZS(L) = ZS
TS(L) = T
T = T + DS(L)/S
T = -T
117 CONTINUE
XXS(1) = (XXS(2)/DS(1) + XXS(2)/DS(2) - XXS(3)/DS(2))*DS(1)
ZZS(1) = (ZZS(2)/DS(1) + ZZS(2)/DS(2) - ZZS(3)/DS(2))*DS(1)
SLP1 = 0.
SLPN = 0.
CALL CURV1(LPU,TS,XXS,CLP1,SLPN,XR,TEMP,SIGMA)
SLP1 = 0.

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	SLPN = 0.	5APR.249
	CALL CURVI(LPU,TS,ZZS,SLP1,SLPN,ZR,TEMP,SIGMA)	5APR.250
	IT = 1	5APR.251
	DO 118 L=1,LPU	5APR.252
	T = TS(L)	5APR.253
	DDX(L) = CURVD(T,LPU,TS,XXS,XR,SIGMA,IT)	5APR.254
	DDZ(L) = CURVD(T,LPU,TS,ZZS,ZR,SIGMA,IT)	5APR.255
	IT = 2	5APR.256
118	CONTINUE	5APR.257
	DDX(1) = (DDX(2)/DS(1) + DDX(2)/DS(2) - DDX(3)/DS(2))*DS(1)	5APR.258
	DDZ(1) = (DDZ(2)/DS(1) + DDZ(2)/DS(2) - DDZ(3)/DS(2))*DS(1)	5APR.259
	DO 115 L =1,LPU	5APR.260
	XNUM = (XXS(L)**2 + ZZS(L)**2)**1.5	5APR.261
	DENOM = XXS(L)*DDZ(L) - ZZS(L)*DDX(L)	5APR.262
	R(L,NX) = (XNUM/DENOM)*S	5APR.263
115	CONTINUE	5APR.264
	WRITE(6,704)	5APR.265
	WRITE(6,701)	5APR.266
	WRITE(6,702)	5APR.267
	WRITE(6,703) (XK(L),ZK(L),R(L,NX),L=1,LPU)	5APR.268
	WRITE(6,704)	5APR.269
114	CONTINUE	5APR.270
120	CONTINUE	5APR.271
500	FORMAT(14I5)	5APR.272
501	FORMAT(7F10.0)	5APR.273
601	FORMAT(1H0,10F10.5)	5APR.274
602	FORMAT(1H0,40X,*AIRFOIL GEOMETRY*/)	5APR.275
603	FORMAT(1H0,40X,*COMPONENT =*,13/)	5APR.276
604	FORMAT(1H0,30X,*UPPER SURFACE COORDINATES*/)	5APR.277
605	FORMAT(1H0,30X,*LOWER SURFACE COORDINATES*/)	5APR.278
606	FORMAT(1H0,20X,*INPUT*,45X,*LOFTED*/)	5APR.279
607	FORMAT(1H0,5X,F10.5,10X,F10.5,20X,F10.5,10X,F10.5)	5APR.280
608	FORMAT(1H0,10X,*X-IN*,15X,*Z-IN*,26X,*X-OUT*,15X,*Z-OUT*/)	5APR.281
701	FORMAT(1H0,40X,*RADIUS OF CURVATURE ON FLAP UPPER SURFACE*/)	5APR.282
702	FORMAT(1H0,10X,*X-COORD* 14X *Z-COORD* 10X *RADIUS*/)	5APR.283
703	FORMAT(1H0,5X,F10.5,12X,F10.5,8X,E12.4)	5APR.284
704	FORMAT(1H0/1H0,15X,100(1H*))//)	5APR.285
	RETURN	5APR.286
	END	5APR.287
	SUBROUTINE ROTAN(X,Z,TH,X0,Z0,DX,DZ,XX,ZZ)	5APR.289
C	X,Z INPUT COORDINATES	5APR.290
C	TH FLAP OR SLAT DEFLECTION ANLGE - RADIANS (CLOCKWISE POSITIVE)	5APR.291
C	X0,Z0 PIVOT POINT (INPUT COORDINATES)	5APR.292
C	DX,DZ TRANSLATION TO MAIN AIRFOIL COORDINATES	5APR.293
C	XX,ZZ OUTPUT COORDINATES	5APR.294
	XB = X-X0	5APR.295
	ZB = Z-Z0	5APR.296
	XB1 = XB*COS(TH) + ZB*SIN(TH)	5APR.297
	ZB1 = XB*(-1)*SIN(TH) + ZB*COS(TH)	5APR.298
	XX = XB1 + X0 + DX	5APR.299
	ZZ = ZB1 + Z0 + DZ	5APR.300
	RETURN	5APR.301
	END	5APR.302

	SUBROUTINE KURV1 (N,X,Y,SLP1,SLPN,XP,YP,TEMP,S,SIGMA)	SAPR.304
C	THIS SUBROUTINE DETERMINES THE PARAMETERS NECESSARY TO	SAPR.305
C	COMPUTE A SPLINE UNDER TENSION PASSING THROUGH A SEQUENCE	SAPR.306
C	OF PAIRS (X(1),Y(1)),...,(X(N),Y(N)) IN THE PLANE. THE	SAPR.307
C	SLOPES AT THE TWO ENDS OF THE CURVE MAY BE SPECIFIED OR	SAPR.308
C	OMITTED. FOR ACTUAL COMPUTATION OF POINTS ON THE CURVE IT	SAPR.309
C	IS NECESSARY TO CALL THE SUBROUTINE KURV2.	SAPR.310
C	COMMON/DZDX/ DX(30),DY(30),DS(30)	SAPR.311
	INTEGER N	SAPR.312
	REAL X(N),Y(N),XP(N),YP(N),TEMP(N),S,SIGMA	SAPR.313
	DEGRAD=3.1415926535897932/180.	SAPR.314
	NM1=N-1	SAPR.315
	NP1=N+1	SAPR.316
	DELX1=X(2)-X(1)	SAPR.317
	DELY1=Y(2)-Y(1)	SAPR.318
	DELS1=SQRT(DELX1*DELX1+DELY1*DELY1)	SAPR.319
	DX1=DELX1/DELS1	SAPR.320
	DY1=DELY1/DELS1	SAPR.321
C		SAPR.322
C	DETERMINE SLOPES IF NECESSARY	SAPR.323
C		SAPR.324
C	IF (SIGMA.LT.0.) GO TO 70	SAPR.325
	SLPP1=SLP1*DEGRAD	SAPR.326
	SLPPN=SLPN*DEGRAD	SAPR.327
C		SAPR.328
C	SET UP RIGHT HAND SIDES OF TRIDIAGONAL LINEAR SYSTEM FOR XP	SAPR.329
C	AND YP	SAPR.330
C		SAPR.331
C		SAPR.332
10	XP(1)=DX1-COS(SLPP1)	SAPR.333
	YP(1)=DY1-SIN(SLPP1)	SAPR.334
	TEMP(1)=DELS1	SAPR.335
	DS(1) = TEMP(1)	SAPR.336
	S=DELS1	SAPR.337
	DX(1) = COS(SLPP1)	SAPR.338
	DY(1) = SIN(SLPP1)	SAPR.339
	IF (N.EQ.2) GO TO 30	SAPR.340
	DO 20 I=2,NM1	SAPR.341
	DELX2=X(I+1)-X(I)	SAPR.342
	DELY2=Y(I+1)-Y(I)	SAPR.343
	DELS2=SQRT(DELX2*DELX2+DELY2*DELY2)	SAPR.344
	DX2=DELX2/DELS2	SAPR.345
	DY2=DELY2/DELS2	SAPR.346
	XP(I)=DX2-DX1	SAPR.347
	YP(I)=DY2-DY1	SAPR.348
	TEMP(I)=DELS2	SAPR.349
	DS(I) = TEMP(I)	SAPR.350
	DELX1=DELX2	SAPR.351
	DELY1=DELY2	SAPR.352
	DELS1=DELS2	SAPR.353
	A = DY2*DX1/DX2	SAPR.354
	B = DY1*DX2/DX1	SAPR.355
	DX(I) = .5*(DX1 + DX2)	SAPR.356
	DY(I) = .5*(A + B)	SAPR.357
	DX1=DX2	SAPR.358
	DY1=DY2	SAPR.359
C		SAPR.360
C	ACCUMULATE POLYGONAL ARCLENGTH	SAPR.361
C		SAPR.362
C	S=S+DELS1	SAPR.363
20	XP(N)=COS(SLPPN)-DX1	SAPR.364
30	YP(N)=SIN(SLPPN)-DY1	SAPR.365
	DX(N) = COS(SLPPN)	SAPR.366
	DY(N) = SIN(SLPPN)	SAPR.367
	DS(N) = DS(N-1)	SAPR.368
C		SAPR.369
C	DENORMALIZE TENSION FACTOR	SAPR.370
C		SAPR.371
C	SIGMAP=ABS(SIGMA)*FLOAT(N-1)/S	SAPR.372
C		

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C	PERFORM FORWARD ELIMINATION ON TRIDIAGONAL SYSTEM	SAPR.373
C	DELS=SIGMAP*TEMP(1)	SAPR.374
	EXPS=EXP(DELS)	SAPR.375
	SINH5=.5*(EXPS-1./EXPS)	SAPR.376
	SINHIN=1./(TEMP(1)*SINH5)	SAPR.377
	DIAG1=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINH5)	SAPR.378
	DIAGIN=1./DIAG1	SAPR.379
	XP(1)=DIAGIN*XP(1)	SAPR.380
	YP(1)=DIAGIN*YP(1)	SAPR.381
	SPDIAG=SINHIN*(SINH5-DELS)	SAPR.382
	TEMP(1)=DIAGIN*SPDIAG	SAPR.383
	IF (N.EQ.2) GO TO 50	SAPR.384
	DO 40 I=2,NM1	SAPR.385
	DELS=SIGMAP*TEMP(I)	SAPR.386
	EXPS=EXP(DELS)	SAPR.387
	SINH5=.5*(EXPS-1./EXPS)	SAPR.388
	SINHIN=1./(TEMP(I)*SINH5)	SAPR.389
	DIAG2=SINHIN*(DELS*(.5*(EXPS+1./EXPS))-SINH5)	SAPR.390
	DIAGIN=1./(DIAG1+DIAG2-SPDIAG*TEMP(I-1))	SAPR.391
	XP(I)=DIAGIN*(XP(I)-SPDIAG*XP(I-1))	SAPR.392
	YP(I)=DIAGIN*(YP(I)-SPDIAG*YP(I-1))	SAPR.393
	SPDIAG=SINHIN*(SINH5-DELS)	SAPR.394
	TEMP(I)=DIAGIN*SPDIAG	SAPR.395
40	DIAG1=DIAG2	SAPR.396
50	DIAGIN=1./(DIAG1-SPDIAG*TEMP(NM1))	SAPR.397
	XP(N)=DIAGIN*(XP(N)-SPDIAG*XP(NM1))	SAPR.398
	YP(N)=DIAGIN*(YP(N)-SPDIAG*YP(NM1))	SAPR.399
C		SAPR.400
C	PERFORM BACK SUBSTITUTION	SAPR.401
C		SAPR.402
	DO 60 I=2,N	SAPR.403
	IBAK=NP1-I	SAPR.404
	XP(IBAK)=XP(IBAK)-TEMP(IBAK)*XP(IBAK+1)	SAPR.405
60	YP(IBAK)=YP(IBAK)-TEMP(IBAK)*YP(IBAK+1)	SAPR.406
	RETURN	SAPR.407
70	IF (N.EQ.2) GO TO 80	SAPR.408
C		SAPR.409
C	IF NO SLOPES ARE GIVEN, USE SECOND ORDER INTERPOLATION ON	SAPR.410
C	INPUT DATA FOR SLOPES AT ENDPOINTS	SAPR.411
C		SAPR.412
	DELS2=SQRT((X(3)-X(2))**2+(Y(3)-Y(2))**2)	SAPR.413
	DELS12=DELS1+DELS2	SAPR.414
	C1=-(DELS12*DELS1)/DELS12/DELS1	SAPR.415
	C2=DELS12/DELS1/DELS2	SAPR.416
	C3=-DELS1/DELS12/DELS2	SAPR.417
	SX=C1*X(1)+C2*X(2)+C3*X(3)	SAPR.418
	SY=C1*Y(1)+C2*Y(2)+C3*Y(3)	SAPR.419
	SLPP1=ATAN2(SY,SX)	SAPR.420
	DELNMI=SQRT((X(N-2)-X(NM1))**2+(Y(N-2)-Y(NM1))**2)	SAPR.421
	DELN=SQRT((X(NM1)-X(N))**2+(Y(NM1)-Y(N))**2)	SAPR.422
	DELNN=DELNMI+DELN	SAPR.423
	C1=(DELNN+DELN)/DELNN/DELN	SAPR.424
	C2=-DELNN/DELN/DELNMI	SAPR.425
	C3=DELN/DELNN/DELNMI	SAPR.426
	SX=C3*X(N-2)+C2*X(NM1)+C1*X(N)	SAPR.427
	SY=C3*Y(N-2)+C2*Y(NM1)+C1*Y(N)	SAPR.428
	SLPPN=ATAN2(SY,SX)	SAPR.429
	GO TO 10	SAPR.430
C		SAPR.431
C	IF ONLY TWO POINTS AND NO SLOPES ARE GIVEN, USE STRAIGHT	SAPR.432
C	LINE SEGMENT FOR CURVE	SAPR.433
C		SAPR.434
80	XP(1)=0.	SAPR.435
	XP(2)=0.	SAPR.436
	YP(1)=0.	SAPR.437
	YP(2)=0.	SAPR.438
	RETURN	SAPR.439
	END	SAPR.440
		SAPR.441

	SUBROUTINE KURV2D(T,XS,YS,N,X,Y,XP,YP,S,SIGMA)	5APR.443
	INTEGER N	5APR.444
	REAL T,XS,YS,X(N),Y(N),XP(N),YP(N),S,SIGMA	5APR.445
C	DENORMALIZE SIGMA	5APR.446
C		5APR.447
C	SIGMAP=ABS(SIGMA)*FLOAT(N-1)/S	5APR.448
C		5APR.449
C	STRETCH UNIT INTERVAL INTO ARCLENGTH DISTANCE	5APR.450
C		5APR.451
C	TN=ABS(T*S)	5APR.452
C		5APR.453
C	FOR NEGATIVE T START SEARCH WHERE PREVIOUSLY TERMINATED,	5APR.454
C	OTHERWISE START FROM BEGINNING	5APR.455
C		5APR.456
C		5APR.457
C	IF (T.LT.0.) GO TO 10	5APR.458
	I1=2	5APR.459
	XS=X(I1)	5APR.460
	YS=Y(I1)	5APR.461
	SUM=0.	5APR.462
	IF (T.LE.0.) RETURN	5APR.463
10	CONTINUE	5APR.464
C		5APR.465
C	DETERMINE INTO WHICH SEGMENT TN IS MAPPED	5APR.466
C		5APR.467
	DO 20 I=I1,N	5APR.468
	DELX=X(I)-X(I-1)	5APR.469
	DELY=Y(I)-Y(I-1)	5APR.470
	DELS=SQRT(DELX*DELX+DELY*DELY)	5APR.471
	IF (SUM+DELS-TN) 20,30,30	5APR.472
20	SUM=SUM+DELS	5APR.473
C		5APR.474
C	IF ABS(T) IS GREATER THAN 1., RETURN TERMINAL POINT ON	5APR.475
C	CURVE	5APR.476
C		5APR.477
	XS=X(N)	5APR.478
	YS=Y(N)	5APR.479
	RETURN	5APR.480
C		5APR.481
C	SET UP AND PERFORM INTERPOLATION	5APR.482
C		5APR.483
30	DEL1=TN-SUM	5APR.484
	DEL2=DELS-DEL1	5APR.485
	EXPS1=EXP(SIGMAP*DEL1)	5APR.486
	COSH01 = .5*(EXPS1 + 1./EXPS1)	5APR.487
	EXPS=EXP(SIGMAP*DEL2)	5APR.488
	COSH02 = .5*(EXPS + 1./EXPS)	5APR.489
	EXPS=EXPS1*EXPS	5APR.490
	SINHS=.5*(EXPS-1./EXPS1)/SIGMAP	5APR.491
	XS = (XP(I)*COSH01-XP(I-1)*COSH02)/SINHS +	5APR.492
	1*((X(I)-XP(I))-(X(I-1)-XP(I-1)))/DELS	5APR.493
	YS = (YP(I)*COSH01 -YP(I-1)*COSH02)/SINHS +	5APR.494
	1*((Y(I)-YP(I))-(Y(I-1)-YP(I-1)))/DELS	5APR.495
	I1=I	5APR.496
	RETURN	5APR.497
	END	5APR.498

	SUBROUTINE CURV1 (N,X,Y,SLP1,SLPN,YP,TEMP,SIGMA)	5APR.500
C	THIS SUBROUTINE DETERMINES THE PARAMETERS NECESSARY TO	5APR.501
C	COMPUTE AN INTERPOLATORY SPLINE UNDER TENSION THROUGH	5APR.502
C	A SEQUENCE OF FUNCTIONAL VALUES. THE SLOPES AT THE TWO	5APR.503
C	ENDS OF THE CURVE MAY BE SPECIFIED OR OMITTED. FOR ACTUAL	5APR.504
C	COMPUTATION OF POINTS ON THE CURVE IT IS NECESSARY TO CALL	5APR.505
C	THE FUNCTION CURV2.	5APR.506
	INTEGER N	5APR.507
	REAL X(N),Y(N),SLP1,SLPN,YP(N),TEMP(N),SIGMA	5APR.508
	NM1=N-1	5APR.509
	NP1=N+1	5APR.510
	DELX1=X(2)-X(1)	5APR.511
	DX1=(Y(2)-Y(1))/DELX1	5APR.512
C		5APR.513
C	DETERMINE SLOPES IF NECESSARY	5APR.514
C		5APR.515
	IF (SIGMA.LT.0.) GO TO 50	5APR.516
	SLPP1=SLP1	5APR.517
	SLPPN=SLPN	5APR.518
C		5APR.519
C	DENORMALIZE TENSION FACTOR	5APR.520
C		5APR.521
10	SIGMAP=ABS(SIGMA)*FLOAT(N-1)/(X(N)-X(1))	5APR.522
C		5APR.523
C	SET UP RIGHT HAND SIDE AND TRIDIAGONAL SYSTEM FOR YP AND	5APR.524
C	PERFORM FORWARD ELIMINATION	5APR.525
C		5APR.526
	DELS=SIGMAP*DELX1	5APR.527
	EXPS=EXP(DELS)	5APR.528
	SINHS=.5*(EXPS-1./EXPS)	5APR.529
	SINHIN=1./(DELX1*SINHS)	5APR.530
	DIAG1=SINHIN*(DELS*.5*(EXPS+1./EXPS)-SINHS)	5APR.531
	DIAGIN=1./DIAG1	5APR.532
	YP(1)=DIAGIN*(DX1-SLPP1)	5APR.533
	SPDIAG=SINHIN*(SINHS-DELS)	5APR.534
	TEMP(1)=DIAGIN*SPDIAG	5APR.535
	IF (N.EQ.2) GO TO 30	5APR.536
	DO 20 I=2,NM1	5APR.537
	DELX2=X(I+1)-X(I)	5APR.538
	DX2=(Y(I+1)-Y(I))/DELX2	5APR.539
	DELS=SIGMAP*DELX2	5APR.540
	EXPS=EXP(DELS)	5APR.541
	SINHS=.5*(EXPS-1./EXPS)	5APR.542
	SINHIN=1./(DELX2*SINHS)	5APR.543
	DIAG2=SINHIN*(DELS*(.5*(EXPS+1./EXPS))-SINHS)	5APR.544
	DIAGIN=1./(DIAG1+DIAG2-SPDIAG*TEMP(I-1))	5APR.545
	YP(I)=DIAGIN*(DX2-DX1-SPDIAG*YP(I-1))	5APR.546
	SPDIAG=SINHIN*(SINHS-DELS)	5APR.547
	TEMP(I)=DIAGIN*SPDIAG	5APR.548
	DX1=DX2	5APR.549
20	DIAG1=DIAG2	5APR.550
30	DIAGIN=1./(DIAG1-SPDIAG*TEMP(NM1))	5APR.551
	YP(N)=DIAGIN*(SLPPN-DX2-SPDIAG*YP(NM1))	5APR.552
C		5APR.553
C	PERFORM BACK SUBSTITUTION	5APR.554
C		5APR.555
	DO 40 I=2,N	5APR.556
	IBAK=NP1-I	5APR.557
40	YP(IBAK)=YP(IBAK)-TEMP(IBAK)*YP(IBAK+1)	5APR.558
	RETURN	5APR.559
50	IF (N.EQ.2) GO TO 60	5APR.560
C		5APR.561
C	IF NO DERIVATIVES ARE GIVEN USE SECOND ORDER POLYNOMIAL	5APR.562
C	INTERPOLATION ON INPUT DATA FOR VALUES AT ENDPOINTS.	5APR.563
C		5APR.564
	DELX2=X(3)-X(2)	5APR.565
	DELX12=X(3)-X(1)	5APR.566
	C1=- (DELX12*DELX1)/DELX12/DELX1	5APR.567
	C2=DELX12/DELX1/DELX2	5APR.568

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	C3=-DELX1/DELX12/DELX2	SAPR.569
	SLPPI=C1*Y(1)+C2*Y(2)+C3*Y(3)	SAPR.570
	DELN=X(N)-X(NM1)	SAPR.571
	DELNM=X(NM1)-X(N-2)	SAPR.572
	DELNN=X(N)-X(N-2)	SAPR.573
	C1=(DELNN*DELN)/DELNN/DELN	SAPR.574
	C2=-DELNN/DELN/DELNM1	SAPR.575
	C3=DELN/DELNN/DELNM1	SAPR.576
	SLPPN=C3*Y(N-2)+C2*Y(NM1)+C1*Y(N)	SAPR.577
	GO TO 10	SAPR.578
C		SAPR.579
C	IF ONLY TWO POINTS AND NO DERIVATIVES ARE GIVEN, USE	SAPR.580
C	STRAIGHT LINE FOR CURVE	SAPR.581
C		SAPR.582
60	YP(1)=0.	SAPR.583
	YP(2)=0.	SAPR.584
	RETURN	SAPR.585
	END	SAPR.586
	FUNCTION CURVD (T,N,X,Y,YP,SIGMA,IT)	SAPR.588
C	THIS FUNCTION DIFFERENTIATES A CURVE AT A GIVEN POINT	SAPR.589
C	USING AN INTERPOLATORY SPLINE UNDER TENSION. THE SUBROUTINE	SAPR.590
	INTEGER N,IT	SAPR.591
	REAL T,X(N),Y(N),YP(N),SIGMA	SAPR.592
	S=X(N)-X(1)	SAPR.593
C		SAPR.594
C	DENORMALIZE SIGMA	SAPR.595
C		SAPR.596
	SIGMAP=ABS(SIGMA)*(N-1)/S	SAPR.597
C		SAPR.598
C	IF IT.NE.1 START SEARCH WHERE PREVIOUSLY TERMINATED,	SAPR.599
C	OTHERWISE START FROM BEGINNING	SAPR.600
C		SAPR.601
	IF (IT.EQ.1) I1=2	SAPR.602
C		SAPR.603
C	SEARCH FOR INTERVAL	SAPR.604
C		SAPR.605
	DO 10 I=I1,N	SAPR.606
	IF (X(I)-T) 10,10,20	SAPR.607
10	CONTINUE	SAPR.608
	I=N	SAPR.609
C		SAPR.610
C	SET UP AND PERFORM INTERPOLATION	SAPR.611
C		SAPR.612
20	DEL1=T-X(I-1)	SAPR.613
	DEL2=X(I)-T	SAPR.614
	DELS=X(I)-X(I-1)	SAPR.615
	EXPS1=EXP(SIGMAP*DEL1)	SAPR.616
	COSH01=.5*(EXPS1+1./EXPS1)	SAPR.617
	EXPS=EXP(SIGMAP*DEL2)	SAPR.618
	COSH02=.5*(EXPS+1./EXPS)	SAPR.619
	EXPS=EXPS1*EXPS	SAPR.620
	SINH5=.5*(EXPS-1./EXPS)/SIGMAP	SAPR.621
	CURVD=(YP(I)*COSH01-YP(I-1)*COSH02)/SINH5+((Y(I)-YP(I))-(Y(I-1)-YP(I-1))	SAPR.622
	1(I-1)))/DELS	SAPR.623
	I1=I	SAPR.624
	RETURN	SAPR.625
	END	SAPR.626

	SUBROUTINE SOLVE	SOLVE.2
		SOLVE.3
C	PROGRAM TO SOLVE SYSTEM OF EQUATIONS AND COMPUTE	SOLVE.4
C	PRESSURES, FORCES AND MOMENTS	SOLVE.5
C		SOLVE.6
	COMMON /PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UIIN,REFX,REFZ,CREF	SOLVE.7
	COMMON /CPS/ CPS(600)	SOLVE.8
	COMMON /CL/ CL,CDT,CDF,CDP,DUD(2),CM	SOLVE.9
	COMMON /SCRAT/ U(600),V(600),W(600),A(100,100),GW(600),DMM(200),	SOLVE.10
	IXIP(8,100),ZIP(8,100),CPIP(8,100),NPP(8),DUMMY(192)	SOLVE.11
	COMMON/XSOLVE/ISOLVE	SOLVE.12
	COMMON/CLCM/ CLX(4),CMX(4)	SOLVE.13
	COMMON /POINT/ DELTA(600),THET(600),CHORD(600),QS(8,100),DUM(400),	SOLVE.14
	IXU(750),XPT(600),ZPT(600)	SOLVE.15
	COMMON /ITR/ ITR,ITRMAX	SOLVE.16
	COMMON/KPRINT/KPRINT	SOLVE.17
	COMMON /VELCOM/ NPOINT,NPART,IMAX,EX,PRINT	SOLVE.18
	COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(4),GTU(4),GTL(4),	SOLVE.19
	INPU(4),NPL(4),ISTG(4),OTU(4),QTL(4),DIN(26),THKTE(4)	SOLVE.20
	COMMON /SIG/ SIG(200),SIGMAD(200),SIGMA(8,100)	SOLVE.21
	COMMON/GAMM/GA,Q(600)	SOLVE.22
		SOLVE.23
C	DIMENSION UA(600),GA(600),WA(600),CP(600),NS(600),NB(600),	SOLVE.24
	INW(600),NT(600),AS(100),AT(2)	SOLVE.25
	DIMENSION CPU(100),CPL(100)	SOLVE.26
	DIMENSION US(100),WS(100)	SOLVE.27
C		SOLVE.28
	EQUIVALENCE (UA,A),(WA,A(1201)),(CP,A(1801)),	SOLVE.29
	I(NS,A(2401)),(NW,U),(NB,V),(NT,W),(AS,A(3001))	SOLVE.30
C		SOLVE.31
	REAL MACH,NB,NW,NT,NS	SOLVE.32
	INTEGER COMPT,PRINT	SOLVE.33
C		SOLVE.34
	NWING=NPOINT	SOLVE.35
	NMAX=60	SOLVE.36
	PRINT=3	SOLVE.37
	EM=MACH	SOLVE.38
	B2=1.0-EM*EM	SOLVE.39
	BETA=SQRT(B2)	SOLVE.40
	RB2=1.0/B2	SOLVE.41
	REWIND 1	SOLVE.42
	REWIND 3	SOLVE.43
	REWIND 8	SOLVE.44
	ALP=ALPHA/57.2957795	SOLVE.45
	SINAL=SIN(ALP)	SOLVE.46
	COSAL=COS(ALP)	SOLVE.47
	CALL SORTR	SOLVE.48
		SOLVE.49
C		SOLVE.50
C	CALCULATE NORMAL VELOCITIES REQUIRED TO SATISFY BOUNDARY	SOLVE.51
C	CONDITIONS AT WING CONTROL POINTS	SOLVE.52
		SOLVE.53
	DO 20 I=1,NPOINT	SOLVE.54
	TANDEL=TAN(DELTA(I))	SOLVE.55
	NW(I)=COSAL*TANDEL-SINAL	SOLVE.56
	K=0	SOLVE.57
	ASQ=0.	SOLVE.58
	IF(ITR.EQ.1) GO TO 20	SOLVE.59
	DO 15 N=1,NCMPT	SOLVE.60
	DO 14 NSIDE=1,2	SOLVE.61
	K=K+1	SOLVE.62
	IF(NSIDE.EQ.1) JL=NPU(N)	SOLVE.63
	IF(NSIDE.EQ.2) JL=NPL(N)	SOLVE.64
	READ(1) AT(NSIDE),(AS(J),J=1,JL)	SOLVE.65
	DO 12 J=1,JL	SOLVE.66
12	ASQ = ASQ + AS(J)*QS(K,J)	SOLVE.67
14	CONTINUE	SOLVE.68
	DNW=ASQ	SOLVE.69
	IF(THKTE(N).EQ.0.,OR.ITR.GT.1) DNW=ASQ+AT(1)*GTU(N)+AT(2)*GTL(N)	SOLVE.70
	NW(I)=NW(I)-DNW	

15	CONTINUE	SOLVE.71
20	CONTINUE	SOLVE.72
	REWIND 1	SOLVE.73
	IF(KPRINT.GT.0) WRITE(6,170) (NW(I),I=1,NWING)	SOLVE.74
C		SOLVE.75
C	SOLVE MATRIX EQUATIONS - DIRECT SOLUTION IF MATRICES	SOLVE.76
C	LESS THAN 60*60 . ITERATIVE SOLUTION OTHERWISE	SOLVE.77
C		SOLVE.78
	IF(ISOLVE.GT.0) GO TO 30	SOLVE.79
25	CALL PARTIN	SOLVE.80
	GO TO 50	SOLVE.81
30	CALL DIAGIN	SOLVE.82
	CALL ITRATE	SOLVE.83
50	CONTINUE	SOLVE.84
	I=0	SOLVE.85
	J=0	SOLVE.86
	JMAX=0	SOLVE.87
	DO 60 N=1,NCMPT	SOLVE.88
	J2=NC(N)	SOLVE.89
	J1=J2-1	SOLVE.90
	IT=J2-2	SOLVE.91
	JMAX=JMAX+J2	SOLVE.92
	IF(THKTE(N).EQ.0..OR.ITR.GT.1) GO TO 52	SOLVE.93
	GTU(N)=GW(IT)	SOLVE.94
	GTL(N)=-GW(IT)	SOLVE.95
52	CONTINUE	SOLVE.96
	DO 60 II=1,J2	SOLVE.97
	I=I+1	SOLVE.98
	IF(II.GT.IT) GO TO 55	SOLVE.99
	J=J+1	SOLVE.100
	GA(I)=GW(J)	SOLVE.101
	GO TO 60	SOLVE.102
55	IF(II.EQ.J1) GA(I)=GTU(N)	SOLVE.103
	IF(II.EQ.J2) GA(I)=GTL(N)	SOLVE.104
60	CONTINUE	SOLVE.105
	DO 75 I=1,NPOINT	SOLVE.106
	U(I)=0.	SOLVE.107
	V(I)=0.	SOLVE.108
	US(I)=0.	SOLVE.109
	WS(I)=0.	SOLVE.110
75	W(I)=0.	SOLVE.111
C		SOLVE.112
C	CALCULATE PRESSURES ON WING PANELS	SOLVE.113
C		SOLVE.114
	DO 100 I=1,NWING	SOLVE.115
	READ(8) (UA(J),WA(J),J=1,JMAX)	SOLVE.116
	DO 90 J=1,JMAX	SOLVE.117
	U(I)=U(I)+UA(J)*GA(J)-WA(J)*Q(J)*RB2	SOLVE.118
	W(I)=W(I)+WA(J)*GA(J)+UA(J)*Q(J)	SOLVE.119
	US(I)=US(I)-WA(J)*Q(J)*RB2	SOLVE.120
	WS(I)=WS(I)+UA(J)*Q(J)	SOLVE.121
90	CONTINUE	SOLVE.122
	AS(I)=WS(I)-BETA*TAN(DELTA(I))*US(I)	SOLVE.123
	NS(I)=W(I)-BETA*TAN(DELTA(I))*U(I)-AS(I)	SOLVE.124
	U(I)=U(I)+COSAL	SOLVE.125
	W(I)=W(I)+SINAL	SOLVE.126
	CP(I) = 1.0-U(I)*U(I) - W(I)*W(I)	SOLVE.127
	V(I) = 1.0 - GW(I)*GW(I) - Q(I)*Q(I)	SOLVE.128
C	IF(ITR.GT.1) CP(I)=(CP(I)+CPS(I))*0.5	SOLVE.129
C	IF(ITR.GT.1) CP(I)=.665667*CP(I) +.333333*CPS(I)	SOLVE.130
	IF(ITR.GT.1) CP(I)=(CP(I)+CPS(I))*0.5	SOLVE.131
	CPS(I)=CP(I)	SOLVE.132
100	CONTINUE	SOLVE.133
	IF(KPRINT.GT.0) WRITE(6,170) (NS(I),I=1,NWING)	SOLVE.134
C		SOLVE.135
C	CALCULATE INDEX OF STAGNATION POINT	SOLVE.136
C	AND DETERMINE LIFT OF EACH ELEMENT	SOLVE.137
C		SOLVE.138
	I2=0	SOLVE.139

IT=0	SOLVE.140
I=0	SOLVE.141
IX = 0	SOLVE.142
K=0	SOLVE.143
DO 120 N=1,NCMPT	SOLVE.144
K=K+1	SOLVE.145
J2=NC(N)	SOLVE.146
J1=J2-1	SOLVE.147
JN=NPU(N)	SOLVE.148
I1=IT+1	SOLVE.149
IN=I2	SOLVE.150
I2 = IX + J2 - 2	SOLVE.151
IX = I2	SOLVE.152
IT=J2-2	SOLVE.153
IL=I1+JN-1	SOLVE.154
ISTAG=I1	SOLVE.155
UMX = 0.	SOLVE.156
J=0	SOLVE.157
DO 110 II=1,IT	SOLVE.158
I=I+1	SOLVE.159
J=J+1	SOLVE.160
IF(I.LT.IL) CPU(J)=CP(I)	SOLVE.161
IF(I.GE.IL) CPL(J-JN+1)=CP(I)	SOLVE.162
IF(I.EQ.I2) GO TO 110	SOLVE.163
IF(CP(I).LT.0.) GO TO 110	SOLVE.164
IF(I.EQ.IL) GO TO 115	SOLVE.165
UMXS = UMX	SOLVE.166
UMX = AMAX1(UMX,CP(I))	SOLVE.167
IF(UMX.NE.UMXS) ISTAG = I	SOLVE.168
GO TO 110	SOLVE.169
115 CONTINUE	SOLVE.170
UMXS = UMX	SOLVE.171
UMX = AMAX1(UMX,CP(I))	SOLVE.172
IF(UMX.NE.UMXS) ISTAG = I	SOLVE.173
110 CONTINUE	SOLVE.174
ISTG(N)=ISTAG	SOLVE.175
CPUT=1.0-GTU(N)*GTU(N)-QTU(N)*QTU(N)	SOLVE.176
CPLT=1.0-GTL(N)*GTL(N)-QTL(N)*QTL(N)	SOLVE.177
CALL LIFT(N,CPU,CPL,REFX,REFZ,CREF,COSAL,CL,CM)	SOLVE.178
	SOLVE.179
C	SOLVE.180
CLX(N) = CL	SOLVE.181
CMX(N) = CM	SOLVE.182
IF(N.LE.1) GO TO 116	SOLVE.183
CLX(N) = CLX(N) - CLXX	SOLVE.184
CMX(N) = CMX(N) - CMXX	SOLVE.185
116 CONTINUE	SOLVE.186
CLXX = CL	SOLVE.187
CMXX = CM	SOLVE.188
C	SOLVE.189
FILL XIP,ZIP,CPIP ARRAYS FOR UPPER AND LOWER SURFACES	SOLVE.190
C	SOLVE.191
CALL FILL(N,K,IN)	SOLVE.192
120 CONTINUE	SOLVE.193
REWIND 8	SOLVE.194
CALL SECOND(TIME)	SOLVE.195
WRITE(6,300) TIME	SOLVE.196
RETURN	SOLVE.197
135 FORMAT(1H0,20HPRESSURE COEFFICIENT)	SOLVE.198
140 FORMAT(1H1,39HVELOCITIES AND PRESSURE ON WING, MACH=FS.3	SOLVE.199
1,3X,6HALPHA=F7.3 //)	SOLVE.200
170 FORMAT(1H0,10F10.5)	SOLVE.201
185 FORMAT(1X,5HPANEL,10X,6HVORTEX,10X,5HAXIAL,11X,7HLATERAL,10X,	SOLVE.202
18HVERTICAL,10X,8HPRESSURE/2X,3HNO.,10X,8HSTRENGTH,8X,8HVELOCITY,	SOLVE.203
29X,8HVELOCITY,9X,8HVELOCITY,9X,11HCOEFFICIENT//)	SOLVE.204
200 FORMAT(1H0,14,7X,F10.5,5X,F10.5,5(7X,F10.5))	SOLVE.205
300 FORMAT(1H0,6H TIME = F10.5)	SOLVE.206
600 FORMAT(1H0,15)	SOLVE.207
601 FORMAT(1H,6HISTAG=,13)	
END	

	SUBROUTINE SORTR	SORTR.2
C		SORTR.3
C	SUBROUTINE TO REORDER SOURCE STRENGTH ARRAYS	SORTR.4
C		SORTR.5
	COMMON /ITR/ ITR,ITRMAX	SORTR.6
	COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(4),GTU(4),GTL(4),	SORTR.7
	INPU(4),NPL(4),ISTG(4),QTU(4),QTL(4),DIN(26),THKTE(4)	SORTR.8
	COMMON /SIG/ SIG(200),SIGMAD(200),SIGMA(8,100)	SORTR.9
	COMMON /SCRAT/ U(600),V(600),W(600),A(100,100),GW(600),DMM(200),	SORTR.10
	IXIP(8,100),ZIP(8,100),CPIP(8,100),NPP(8),DUMMY(192)	SORTR.11
	COMMON /POINT/ DELTA(600),THET(600),CHORD(600),QS(8,100),DUM(400),	SORTR.12
	IXU(750),XPT(600),ZPT(600)	SORTR.13
	COMMON/GAMM/GA(600),Q(600)	SORTR.14
C		SORTR.15
	J=0	SORTR.16
	K=0	SORTR.17
	JS=0	SORTR.18
	DO 100 N=1,NCMPT	SORTR.19
	TE=THETE(N)	SORTR.20
	COST=COS(TE)	SORTR.21
	RSINT=0.	SORTR.22
	IF(TE.NE.0.) RSINT=1.0/SIN(TE)	SORTR.23
	J2=NC(N)+JS	SORTR.24
	JS=JS+J2	SORTR.25
	J1=J2-1	SORTR.26
	JT=J2-2	SORTR.27
	IF(ITR.GT.1) GO TO 10	SORTR.28
	DO 5 I=1,J2	SORTR.29
	J=J+1	SORTR.30
	5 Q(J)=0.	SORTR.31
	GTU(N)=0.	SORTR.32
	GTL(N)=0.	SORTR.33
	QTU(N)=0.	SORTR.34
	QTL(N)=0.	SORTR.35
	GO TO 100	SORTR.36
	10 K=K+1	SORTR.37
	K1=K+1	SORTR.38
	LU=NPU(N)	SORTR.39
	LL=NPL(N)	SORTR.40
	IF(N.EQ.1) ISTAG = ISTG(N)	SORTR.41
	IF(N.EQ.2) ISTAG = ISTG(N)-NC(N-1)+2	SORTR.42
	IF(N.EQ.3) ISTAG=ISTG(N)-NC(N-2)-NC(N-1)+4	SORTR.43
	IF(N.EQ.4) ISTAG = ISTG(N)-NC(N-3)-NC(N-2)-NC(N-1)+6	SORTR.44
	IF(NPP(K).LE.LU) GO TO 50	SORTR.45
	LI=ISTAG-LU+1	SORTR.46
	DO 20 L=1,LU	SORTR.47
	IF(L.LT.LU) J=J+1	SORTR.48
	L1=L+LI	SORTR.49
	QS(K,L)=SIGMA(K,L1)	SORTR.50
	IF(L.LT.LU) Q(J)=QS(K,L)	SORTR.51
	20 CONTINUE	SORTR.52
	DO 40 L=1,LL	SORTR.53
	IF(L.GT.LI+1) GO TO 30	SORTR.54
	IF(L.GT.1) J=J+1	SORTR.55
	L2=L+2-L	SORTR.56
	QS(K1,L)= SIGMA(K,L2)	SORTR.57
	IF(L.GT.1) Q(J)=QS(K1,L)	SORTR.58
	GO TO 40	SORTR.59
	30 L3=L-LI	SORTR.60
	J=J+1	SORTR.61
	QS(K1,L)= SIGMA(K1,L3)	SORTR.62
	Q(J)=QS(K1,L)	SORTR.63
	40 CONTINUE	SORTR.64
	GO TO 95	SORTR.65
	50 IF(NPP(K).LT.LU) GO TO 70	SORTR.66
	DO 60 L=1,LU	SORTR.67
	IF(L.LT.LU) J=J+1	SORTR.68
	QS(K,L)=SIGMA(K,L)	SORTR.69
	IF(L.LT.LU) Q(J)=QS(K,L)	SORTR.70

60	CONTINUE	SORTR.71
	DO 65 L=1,LL	SORTR.72
	IF(L.GT.1) J=J+1	SORTR.73
	QS(K1,L)=SIGMA(K1,L)	SORTR.74
	IF(L.GT.1) Q(J)=QS(K1,L)	SORTR.75
65	CONTINUE	SORTR.76
	GO TO 95	SORTR.77
70	LI=LU-NPP(K)	SORTR.78
	DO 80 L=1,LU	SORTR.79
	IF(L.LT.LU) J=J+1	SORTR.80
	IF(L.GT.LI+1) GO TO 75	SORTR.81
	LI=LI+2-L	SORTR.82
	QS(K,L)=SIGMA(K1,LI)	SORTR.83
	Q(J)=QS(K,L)	SORTR.84
	GO TO 80	SORTR.85
75	L2=L-LI	SORTR.86
	QS(K,L)=SIGMA(K,L2)	SORTR.87
	IF(L.LT.LU) Q(J)=QS(K,L)	SORTR.88
80	CONTINUE	SORTR.89
	DO 90 L=1,LL	SORTR.90
	IF(L.GT.1) J=J+1	SORTR.91
	L3=LI+L	SORTR.92
	QS(K1,L)=SIGMA(K1,L3)	SORTR.93
	IF(L.GT.1) Q(J)=QS(K1,L)	SORTR.94
90	CONTINUE	SORTR.95
95	CONTINUE	SORTR.96
	Q(J1)=QS(K,LU)	SORTR.97
	Q(J2)=QS(K1,LL)	SORTR.98
	Q(JT)=0.	SORTR.99
	JJ=J	SORTR.100
	J=J+2	SORTR.101
	GTU(N)=(-QS(K1,LL)+QS(K,LU)*COST)*RSINT	SORTR.102
	GTL(N)=(-QS(K,LU)+QS(K1,LL)*COST)*RSINT	SORTR.103
	QTU(N)=Q(J1)	SORTR.104
	QTL(N)=Q(J2)	SORTR.105
	K=K+1	SORTR.106
	IF(TMKTE(N).EQ.0..OR.ITR.GT.1) GO TO 100	SORTR.107
	GTU(N)=0.	SORTR.108
	GTL(N)=0.	SORTR.109
100	CONTINUE	SORTR.110
600	FORMAT(1H ,10F10.5)	SORTR.111
	RETURN	SORTR.112
	END	SORTR.113

	SUBROUTINE FILL(N, KK, IN)	FILL.2
		FILL.3
C	FILL XIP,ZIP,CPIP ARRAYS FOR UPPER AND LOWER SURFACES	FILL.4
C		FILL.5
C	COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(4),GTU(4),GTL(4),	FILL.6
	INPU(4),NPL(4),ISTG(4),QTU(4),QTL(4)	FILL.7
	COMMON /SCRAT/ U(600),V(600),W(600),A(100,100),GW(600),DMH(200),	FILL.8
	IXIP(8,100),ZIP(8,100),CPIP(8,100),NPP(8),PAV(100),DUMMY(92)	FILL.9
	COMMON /POINT/ DELTA(600),THET(600),CHORD(600),QS(8,100),DUM(400),	FILL.10
	IXU(30,4),XL(30,4),ZU(30,4),ZL(30,4),DIM(270),XPT(600),ZPT(600)	FILL.11
	DIMENSION CP(600)	FILL.12
	EQUIVALENCE (CP,A(1801))	FILL.13
		FILL.14
C	K=KK	FILL.15
	ISTAG=ISTG(N)-IN	FILL.16
	LU=NPU(N)-1	FILL.17
	LT=NC(N)	FILL.18
	LI=ISTAG-LU.	FILL.19
	JT=LT-2+IN	FILL.20
	IF(LI.LE.0) GO TO 120	FILL.21
	DO 105 L=1,LU	FILL.22

L1=LI+L	FILL.23
LN=L+IN	FILL.24
XIP(K,L1)=XPT(LN)	FILL.25
ZIP(K,L1)=ZPT(LN)	FILL.26
105 CPIP(K,L1)=CP(LN)	FILL.27
LPU=ISTAG+1	FILL.28
NPP(K)=LPU	FILL.29
KUP = NPU(N)	FILL.30
XIP(K,LPU) = XU(KUP,N)	FILL.31
ZIP(K,LPU) = ZU(KUP,N)	FILL.32
L=LU+1+IN	FILL.33
CPIP(K,LPU)=CP(L-1)*(CP(L-1)-CP(L-2))*(XPT(JT)-XPT(L-1))/	FILL.34
1(XPT(L-1)-XPT(L-2))	FILL.35
DO 110 L=1,LI	FILL.36
L2=ISTAG+1-L+IN	FILL.37
XIP(K,L)=XPT(L2)	FILL.38
ZIP(K,L)=ZPT(L2)	FILL.39
110 CPIP(K,L)=CP(L2)	FILL.40
K=K+1	FILL.41
LPL=LI-1-ISTAG	FILL.42
NPP(K)=LPL	FILL.43
DO 115 L=1,LPL	FILL.44
L3=ISTAG+L-1+IN	FILL.45
XIP(K,L)=XPT(L3)	FILL.46
ZIP(K,L)=ZPT(L3)	FILL.47
115 CPIP(K,L)=CP(L3)	FILL.48
L=L3	FILL.49
CPIP(K,LPL)=CP(L-1)*(CP(L-1)-CP(L-2))*(XPT(L)-XPT(L-1))/	FILL.50
1(XPT(L-1)-XPT(L-2))	FILL.51
K1 = K - 1	FILL.52
CPIP(K1,LPU) = (CPIP(K1,LPU) + CPIP(K,LPL))*0.5	FILL.53
CPIP(K,LPL) = CPIP(K1,LPU)	FILL.54
GO TO 160	FILL.55
120 IF(ISTAG.GT.1) GO TO 135	FILL.56
DO 125 L=1,LU	FILL.57
LN=L+IN	FILL.58
XIP(K,L)=XPT(LN)	FILL.59
ZIP(K,L)=ZPT(LN)	FILL.60
125 CPIP(K,L)=CP(LN)	FILL.61
LPU=NPU(N)	FILL.62
NPP(K)=LPU	FILL.63
KUP = NPU(N)	FILL.64
XIP(K,LPU) = XU(KUP,N)	FILL.65
ZIP(K,LPU) = ZU(KUP,N)	FILL.66
L=LU+1+IN	FILL.67
CPIP(K,LPU)=CP(L-1)*(CP(L-1)-CP(L-2))*(XPT(JT)-XPT(L-1))/	FILL.68
1(XPT(L-1)-XPT(L-2))	FILL.69
K=K+1	FILL.70
LPL=NPL(N)	FILL.71
NPP(K)=LPL	FILL.72
I1=IN+1	FILL.73
XIP(K,I1)=XPT(I1)	FILL.74
ZIP(K,I1)=ZPT(I1)	FILL.75
CPIP(K,I1)=CP(I1)	FILL.76
DO 130 L=2,LPL	FILL.77
L3=L+LU-1+IN	FILL.78
XIP(K,L)=XPT(L3)	FILL.79
ZIP(K,L)=ZPT(L3)	FILL.80
130 CPIP(K,L)=CP(L3)	FILL.81
L=L3	FILL.82
CPIP(K,LPL)=CP(L-1)*(CP(L-1)-CP(L-2))*(XPT(L)-XPT(L-1))/	FILL.83
1(XPT(L-1)-XPT(L-2))	FILL.84
K1 = K - 1	FILL.85
CPIP(K1,LPU) = (CPIP(K1,LPU) + CPIP(K,LPL))*0.5	FILL.86
CPIP(K,LPL) = CPIP(K1,LPU)	FILL.87
GO TO 160	FILL.88
135 CONTINUE	FILL.89
LU=NPU(N)-ISTAG	FILL.90
LPU=LU+1	FILL.91

	NPP(K)=LPU	FILL.92
	DO 140 L=1,LU	FILL.93
	L1=L+ISTAG-1+IN	FILL.94
	XIP(K,L)=XPT(L1)	FILL.95
	ZIP(K,L)=ZPT(L1)	FILL.96
140	CPIP(K,L)=CP(L1)	FILL.97
	KUP = NPU(N)	FILL.98
	XIP(K,LPU) = XU(KUP,N)	FILL.99
	ZIP(K,LPU) = ZU(KUP,N)	FILL.100
	L=LU*2	FILL.101
	CPIP(K,LPU)=CP(L-1)+(CP(L-1)-CP(L-2))*(XPT(JT)-XPT(L-1))/	FILL.102
	1(XPT(L-1)-XPT(L-2))	FILL.103
	K=K+1	FILL.104
	LPL=NPL(N)+ISTAG-1	FILL.105
	NPP(K)=LPL	FILL.106
	DO 145 L=1,ISTAG	FILL.107
	L2=ISTAG-L+1+IN	FILL.108
	XIP(K,L)=XPT(L2)	FILL.109
	ZIP(K,L)=ZPT(L2)	FILL.110
145	CPIP(K,L)=CP(L2)	FILL.111
	L1=ISTAG+1	FILL.112
	DO 150 L=L1,LPL	FILL.113
	L3=LU*L-1+IN	FILL.114
	XIP(K,L)=XPT(L3)	FILL.115
	ZIP(K,L)=ZPT(L3)	FILL.116
150	CPIP(K,L)=CP(L3)	FILL.117
	L=L3	FILL.118
	CPIP(K,LPL)=CP(L-1)+(CP(L-1)-CP(L-2))*(XPT(L)-XPT(L-1))/	FILL.119
	1(XPT(L-1)-XPT(L-2))	FILL.120
	K1 = K - 1	FILL.121
	CPIP(K1,LPU) = (CPIP(K1,LPU) + CPIP(K,LPL))*0.5	FILL.122
	CPIP(K,LPL) = CPIP(K1,LPU)	FILL.123
160	CONTINUE	FILL.124
	L1=LPU-1	FILL.125
	L2=LPU-2	FILL.126
	K=K-1	FILL.127
	K1=K+1	FILL.128
	DO 200 L=2,L1	FILL.129
200	PAV(L)=.5*(CPIP(K,L-1)+CPIP(K,L))	FILL.130
	CPIP(K,1)=.5*(CPIP(K,1)+CPIP(K1,1))	FILL.131
	CPIP(K1,1)=CPIP(K,1)	FILL.132
	DO 210 L=2,L1	FILL.133
	CPIP(K,L) = PAV(L)	FILL.134
210	CONTINUE	FILL.135
	CPIP(K,LPU)=CPIP(K,L1)+(CPIP(K,L1)-CPIP(K,L2))	FILL.136
	1*(XIP(K,LPU)-XIP(K,L1))/(XIP(K,L1)-XIP(K,L2))	FILL.137
	L1=LPL-1	FILL.138
	L2=LPL-2	FILL.139
	DO 250 L=2,L2	FILL.140
250	PAV(L)=.5*(CPIP(K1,L)+CPIP(K1,L+1))	FILL.141
	PAV(L1) = .5*(CPIP(K1,L1) + CP(L3))	FILL.142
	DO 220 L=2,L1	FILL.143
	CPIP(K1,L) = PAV(L)	FILL.144
220	CONTINUE	FILL.145
	CPIP(K1,LPL)=CPIP(K1,L1)+(CPIP(K1,L1)-CPIP(K1,L2))	FILL.146
	1*(XIP(K1,LPL)-XIP(K1,L1))/(XIP(K1,L1)-XIP(K1,L2))	FILL.147
	KK=K1	FILL.148
170	FORMAT(1H0,10F10.5)	FILL.149
	RETURN	FILL.150
	END	FILL.151

C SUBROUTINE PARTIN

C DIRECT MATRIX INVERSION

C
COMMON /PARAM/ MACH,ALPHA,REFA,MATIN
COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),NX(58)
COMMON /VELCOM/ NPOINT,NPART,ITRMAX,EX,PRINT
COMMON /SCRAT/ NW(600),NB(600),NT(600),A(100,100),GW(600)
REAL NW,NB,NT
NDIM=100
NWIN=NPOINT
CALL SECOND(TIME)
WRITE(6,300) TIME
REWIND 9
DO 100 I=1,NWING
100 READ(9) (A(I,J),J=1,NWING)
IF(MATIN.EQ.1) GO TO 115
REWIND 9
CALL INVERT(A,NWING,NDIM)
DO 110 I=1,NWING
110 WRITE(9) (A(I,J),J=1,NWING)
MATIN=1
115 DO 120 I=1,NWING
GW(I)=0.
DO 120 J=1,NWING
GW(I)=GW(I)+A(I,J)*NW(J)
120 CONTINUE
150 CALL SECOND(TIME)
WRITE(6,300) TIME
300 FORMAT(1H0,6HTIME = F10.5)
REWIND 9
RETURN
END

PARTIN.2
PARTIN.3
PARTIN.4
PARTIN.5
PARTIN.6
PARTIN.7
PARTIN.8
PARTIN.9
PARTIN.10
PARTIN.11
PARTIN.12
PARTIN.13
PARTIN.14
PARTIN.15
PARTIN.16
PARTIN.17
PARTIN.18
PARTIN.19
PARTIN.20
PARTIN.21
PARTIN.22
PARTIN.23
PARTIN.24
PARTIN.25
PARTIN.26
PARTIN.27
PARTIN.28
PARTIN.29
PARTIN.30
PARTIN.31
PARTIN.32
PARTIN.33
PARTIN.34

SUBROUTINE DIAGIN

COMMON /PARAM/ MACH,ALPHA,REFA,MATIN
COMMON /SCRAT/ NW(600),A(100,100)
COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),NX(58)
IF(MATIN.EQ.1) RETURN
REWIND 3
REWIND 10
NDIM = 100
DO 20 N=1,NCMPT
JT=NC(N)-2
DO 10 I=1,JT
10 READ(3) (A(I,J),J=1,JT)
CALL INVERT(A,JT,NDIM)
20 WRITE(10) A
MATIN=1
REWIND 3
REWIND 10
RETURN
END

DIAGIN.2
DIAGIN.3
DIAGIN.4
DIAGIN.5
DIAGIN.6
DIAGIN.7
DIAGIN.8
DIAGIN.9
DIAGIN.10
DIAGIN.11
DIAGIN.12
DIAGIN.13
DIAGIN.14
DIAGIN.15
DIAGIN.16
DIAGIN.17
DIAGIN.18
DIAGIN.19
DIAGIN.20

	SUBROUTINE ITRATE	ITRATE.2
	COMMON /SCRAT/ NW(600),RW(600),DNW(600),D(100,100),GW(100),GS(600)	ITRATE.3
	1,A(600)	ITRATE.4
	COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),NX(58)	ITRATE.5
	COMMON /VELCOM/ NPOINT,NPART,ITRMAX,EX,PRINT	ITRATE.6
	COMMON/ITR/ITR999,ITRM99	ITRATE.7
	COMMON/ARC/ TOLL1,TOLL2	ITRATE.8
	DIMENSION ITAB(6)	ITRATE.9
	DATA ITAB/25,25,25,30,35,40/,ITEND/6/	ITRATE.10
	REAL NW	ITRATE.11
	INTEGER PRINT	ITRATE.12
	REWIND 9	ITRATE.13
	NOX=ITR999	ITRATE.14
	IF(NOX.GT.ITEND)NOX=ITEND	ITRATE.15
	IMAX=ITAB(NOX)	ITRATE.16
	IT=0	ITRATE.17
	DO 5 N=1,NPOINT	ITRATE.18
	GS(N)=0.	ITRATE.19
5	RW(N)=NW(N)	ITRATE.20
10	IT=IT+1	ITRATE.21
	ITEST=0	ITRATE.22
	IW=0	ITRATE.23
	JW=0	ITRATE.24
	MM = 0	ITRATE.25
	DO 60 N=1,NCMPT	ITRATE.26
	JT=NC(N)-2	ITRATE.27
	READ(10) D	ITRATE.28
	DO 50 I=1,JT	ITRATE.29
	IW=IW+1	ITRATE.30
	JW = MM	ITRATE.31
	GW(IW)=0.	ITRATE.32
	DO 40 J=1,JT	ITRATE.33
	JW=JW+1	ITRATE.34
40	GW(IW)=GW(IW)+D(I,J)*RW(JW)	ITRATE.35
	IF(ABS(GW(IW)-GS(IW)).GT.TOLL2) ITEST = 1	ITRATE.36
	IF(IT.LT.IMAX) GS(IW)=GW(IW)	ITRATE.37
50	CONTINUE	ITRATE.38
	MM = MM + JT	ITRATE.39
60	CONTINUE	ITRATE.40
	REWIND 10	ITRATE.41
C	CALL SECOND(TIME)	ITRATE.42
C	WRITE(6,400) IT,TIME	ITRATE.43
	IF(ITEST.EQ.0) GO TO 90	ITRATE.44
	IT1=IT-1	ITRATE.45
	IF(IT.EQ.IMAX) GO TO 85	ITRATE.46
	DO 80 I=1,NPOINT	ITRATE.47
	DNW(I)=0.	ITRATE.48
	READ(9) (A(J),J=1,NPOINT)	ITRATE.49
	DO 70 J=1,NPOINT	ITRATE.50
70	DNW(I)=DNW(I)+A(J)*GW(J)	ITRATE.51
80	RW(I)=NW(I)-DNW(I)	ITRATE.52
	REWIND 9	ITRATE.53
	IF(IT.LT.IMAX) GO TO 10	ITRATE.54
85	WRITE(6,300) IT	ITRATE.55
	WRITE(6,350) IT1	ITRATE.56
	WRITE(6,600) (GS(I),I=1,NPOINT)	ITRATE.57
	WRITE(6,350) IT	ITRATE.58
	WRITE(6,600) (GW(I),I=1,NPOINT)	ITRATE.59
	RETURN	ITRATE.60
90	WRITE(6,500) IT	ITRATE.61
100	RETURN	ITRATE.62
300	FORMAT(1H0,20HNO CONVERGENCE AFTER ,15,10HITERATIONS,/ 1,1X,32HLAST TWO SOLUTION VECTORS FOLLOW,/)	ITRATE.63
350	FORMAT(1H0,15HSOLUTION VECTOR,15,/)	ITRATE.64
500	FORMAT(1H0,24HSOLUTION CONVERGED AFTER,15,10HITERATIONS,/)	ITRATE.65
400	FORMAT(1H0,14HITERATION NO. ,13,5X,6HTIME =,F10.5)	ITRATE.66
600	FORMAT(1H0,10F10.5)	ITRATE.67
	END	ITRATE.68
		ITRATE.69

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SUBROUTINE INVERT(A,IA,NROWS)
REAL A(NROWS, NROWS), PIVOT, T
INTEGER IPIVOT(125), INDXR(125), INDXC(125)
N = IA
DO 20 J=1, N
20 IPIVOT(J) = 0
DO 550 I=1, N
T = 0.0
DO 105 J=1, N
IF (IPIVOT(J).EQ.1) GO TO 105
DO 100 K=1, N
IF (IPIVOT(K).EQ.1) GO TO 100
IF ( .NOT. (ABS(A(J,K)) -ABS(T) .GT. 0.0) ) GO TO 100
IROW = J
ICOL = K
T = A(J,K)
100 CONTINUE
105 CONTINUE
IPIVOT(ICOL) = IPIVOT(ICOL)+1
IF (IROW.EQ.ICOL) GO TO 260
DO 200 L=1, N
T = A(IROW,L)
A(IROW,L) = A(ICOL,L)
200 A(ICOL,L) = T
260 INDXR(I) = IROW
INDXC(I) = ICOL
PIVOT = A(ICOL,ICOL)
IF (PIVOT) 270, 750, 270
270 A(ICOL,ICOL) = 1.0
DO 350 L=1, N
350 A(ICOL,L) = A(ICOL,L)/PIVOT
DO 540 L=1, N
IF (L.EQ.ICOL) GO TO 540
T = A(L,ICOL)
A(L,ICOL) = 0.0
DO 450 M=1, N
450 A(L,M) = A(L,M)-A(ICOL,M)*T
540 CONTINUE
550 CONTINUE
DO 710 I=1, N
L = N+1-I
IF( INDXR(L) .EQ. INDXC(L) ) GO TO 710
IROW = INDXR(L)
ICOL = INDXC(L)
DO 705 K=1, N
T = A(K,IROW)
A(K,IROW) = A(K,ICOL)
705 A(K,ICOL) = T
710 CONTINUE
C
C SUCCESSFUL SOLUTION
C
C RETURN
C
C 750 CONTINUE
C
C SINGULAR MATRIX
C
C WRITE (6, 751)
751 FORMAT (29H ERROR THE MATRIX IS SINGULAR)
CALL EXIT
END

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INVERT.2
INVERT.3
INVERT.4
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INVERT.63

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SUBROUTINE LIFT(N,CPU,CPL,XREF,ZREF,CREF,COSAL,CL,CM)	LIFT.2
COMMON/POINT/ARRAY(4950)	LIFT.3
COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(12),NPU(4),NPL(4),ISTG(4)	LIFT.4
DIMENSION CPU(1),CPL(1),XU(30,4),XL(30,4)	LIFT.5
EQUIVALENCE (ARRAY(3001),XU),(ARRAY(3121),XL)	LIFT.6
EQUIVALENCE (ARRAY(3241),ZU),(ARRAY(3361),ZL)	LIFT.7
DIMENSION ZU(30,4),ZL(30,4)	LIFT.8
NU=NPU(N)-1	LIFT.9
NL=NPL(N)-1	LIFT.10
IF(N.LE.1) CL = 0.	LIFT.11
IF(N.LE.1) CM = 0.	LIFT.12
CLU=0.	LIFT.13
CLL=0.	LIFT.14
CMU=0.	LIFT.15
CML=0.	LIFT.16
DO 10 I=1,NU	LIFT.17
DELX=XU(I+1,N)-XU(I,N)	LIFT.18
DELZ=ZU(I+1,N)-ZU(I,N)	LIFT.19
XPT=(XU(I,N)+XU(I+1,N))*0.5	LIFT.20
ZPT=(ZU(I,N)+ZU(I+1,N))*0.5	LIFT.21
CZU=CPU(I)*DELX	LIFT.22
CXU=CPU(I)*DELZ	LIFT.23
CLU=CLU+CZU	LIFT.24
CMU=CZU*(XPT-XREF)+CXU*(ZPT-ZREF)+CMU	LIFT.25
10 CONTINUE	LIFT.26
DO 25 I=1,NL	LIFT.27
DELX=XL(I+1,N)-XL(I,N)	LIFT.28
DELZ=ZL(I+1,N)-ZL(I,N)	LIFT.29
XPT=(XL(I,N)+XL(I+1,N))*0.5	LIFT.30
ZPT=(ZL(I,N)+ZL(I+1,N))*0.5	LIFT.31
CXL=CPL(I)*DELZ	LIFT.32
CZL=CPL(I)*DELX	LIFT.33
CLL=CLL+CZL	LIFT.34
CML=CZL*(XPT-XREF)+CXL*(ZPT-ZREF)+CML	LIFT.35
25 CONTINUE	LIFT.36
CL=(CLL-CLU)*COSAL/CREF+CL	LIFT.37
CM=(CMU-CML)/CREF**2 + CM	LIFT.38
RETURN	LIFT.39
END	LIFT.40

OVERLAY(FR15,2,0)		
PROGRAM IBL		IBL.3
COMMON / AKAP / AKAP,AKAP2,C1,PI,PI2		IBL.4
COMMON / AREA / AREA		IBL.5
COMMON / ASCALE / ASCALE		IBL.6
COMMON / CL / CL,CUT,CDF,CDP,SEPTRB(2)		IBL.7
COMMON / DU2T / DU2T		IBL.8
COMMON / HTURB / HTURB		IBL.9
COMMON / INSTB / INSTB,ITRAN		IBL.10
COMMON / ISEP / ISEP,ITRIP,IATT,TE		IBL.11
COMMON / I3D / I3D		IBL.12
COMMON / NBL / NBL		IBL.13
COMMON / NKRQ / IDIAG,AHMINM,AHSTRT,MXXN,MFAIL1,MSTEP2		IBL.14
COMMON / NLAM / NLAM		IBL.15
COMMON / NORDER / NORDER,ALFR,FLAG		IBL.16
COMMON / NPT / NPT		IBL.17
COMMON / NTURB / NTURB		IBL.18
COMMON / NUS / NUS		IBL.19
COMMON / RNB / RNB		IBL.20
COMMON / SANGLE / SANGLE		IBL.21
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),		IBL.22
1CF2(200),DEL(200),DELST2(200),DELT(200),H(200),MHDS(200),H1(200),		IBL.23
2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),		IBL.24
3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),		IBL.25
4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)		IBL.26
COMMON / SEP / SEP		IBL.27
COMMON / TITLE / TITLE(8)		IBL.28

	COMMON / TITLEP / TITLEP(24)	IBL.29
	COMMON / TRIP / TRIP(2)	IBL.30
	COMMON / TRIPUL / TRIPJP,TRIPOP	IBL.31
	COMMON / XIN / XIN(100),YIN(100),UIN(100)	IBL.32
	COMMON / ZZ / ZZ(4)	IBL.33
	COMMON/NXT/NXT	IBL.34
	COMMON/MTRAN/ MTRAN	IBL.35
	COMMON/SEG/ NCMPT,NFLAP,NFP,DUM(44),XTE(4),DUMM(18)	IBL.36
	COMMON/SLOT/HSS(100),TSS(100),OSS(100),CSS(100),USS(100),DTSS(100)	IBL.37
	NTP=3	IBL.38
	CALL INPUT	IBL.39
	CALL BOUND	IBL.40
	IF(MTRAN.GE.2) GO TO 1	IBL.41
	CALL DRAG	IBL.42
1	CONTINUE	IBL.43
	CALL PRINTER	IBL.44
	IF(MTRAN.EQ.1) GO TO 3	IBL.45
	DO 2 I=1,NXT	IBL.46
	HSS(I) = M(I)	IBL.47
	TSS(I) = THT(I)	IBL.48
	OSS(I) = DU(I)	IBL.49
	CSS(I) = CFD(I)	IBL.50
	USS(I) = U(I)	IBL.51
	DTSS(I) = 0.	IBL.52
	IF(I.GE.ITRAN) DTSS(I) = DELT(I)	IBL.53
2	CONTINUE	IBL.54
3	CONTINUE	IBL.55
	RETURN	IBL.56
	END	IBL.57

	SUBROUTINE ACOE(SS,IND)	ACOE.2
	COMMON / SOLN / Y(3),YP(3)	ACOE.3
	EQUIVALENCE (Y(1),TH), (Y(2),P), (Y(3),H)	ACOE.4
	COMMON /USXX/ US , DUS , ALPZ , ALP , K , OAS , KDA	ACOE.5
	COMMON /FSOL/ RTH , BETA , TB , HDS , HHDS , CF1 , F , DGDH	ACOE.6
	COMMON /RPOLY/ C , D , E , J , DCDH , DDDH , DEOH , DJDH	ACOE.7
	COMMON/MATX/ A(4,4),B(4),IPR(3)	ACOE.8
	REAL KDA,K,J,KCTB	ACOE.9
	CALL CPOLY(H)	ACOE.10
	CALL FAT(SS,IND)	ACOE.11
	CF12= CF1/2.0	ACOE.12
	A(1,1) = 1.0	ACOE.13
	A(1,2) = -K*J	ACOE.14
	A(1,3) = -K*P*DJDH	ACOE.15
	B(1) = CF12 - DUS*(2.0 + H)*TH + KDA*(TH - P*C*TB)	ACOE.16
	KCTB = K*C*TB	ACOE.17
	A(2,1) = P*KCTB/TH	ACOE.18
	A(2,2) = E - KCTB - K*F*C/TH/HHDS	ACOE.19
	A(2,3) = P*DEOH - K*P*TB*DCDH - P*KCTB*(1.0 + DGDH)/HHDS	ACOE.20
	BA = TH*(H+1.0) + P*C*TB	ACOE.21
	B(2) = CF12*TB - 2.0*DUS*P*E + K*DUS*(BA) + 2.0*KDA*P*E	ACOE.22
	A(3,1) = HDS	ACOE.23
	A(3,2) = K*D	ACOE.24
	A(3,3) = TH*DGDH + K*P*DDDH	ACOE.25
	B(3) = F + TH*HDS*(KDA - DUS)	ACOE.26
C	DETERM = A(1,1)*A(2,2)*A(3,3) - A(3,2)*A(2,3))	ACOE.27
C	1 -A(1,2)*A(2,1)*A(3,3) - A(2,3)*A(3,1))	ACOE.28
C	1 +A(1,3)*A(2,1)*A(3,2) - A(2,2)*A(3,1))	ACOE.29
C	WRITE(6,6000) SS,US,DUS,DETERM	ACOE.30
	RETURN	ACOE.31
	END	ACOE.32

	SUBROUTINE BOUND	BOUND.2
	COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),	BOUND.3
	1CF2(200),DEL(200),DELST2(200),DELT(200),H(200),HMDS(200),H1(200),	BOUND.4
	2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),	BOUND.5
	3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),	BOUND.6
	4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)	BOUND.7
	COMMON/MTRAN/ MTRAN	BOUND.8
	COMMON/SEG/ NCMPT,NFLAP,NFP,DUM(44),XTE(4),DUMH(18)	BOUND.9
	COMMON / SANGLE / SANGLE	BOUND.10
	COMMON / RNR / RNR	BOUND.11
	COMMON / NUS / NUS	BOUND.12
	COMMON / TRIP / TRIP(2)	BOUND.13
	COMMON / I3D / I3D	BOUND.14
	COMMON / NLAM / NLAM	BOUND.15
	COMMON /INSTB / INSTB,ITRAN	BOUND.16
	COMMON / HTURB / HTURB	BOUND.17
	COMMON / ISEP / ISEF,ITRIP,IATT,TE	BOUND.18
	COMMON / ZZ / ZZ(4)	BOUND.19
	COMMON / NTURB / NTURB	BOUND.20
	COMMON / NBL /NBL	BOUND.21
	COMMON/NXT/NXT	BOUND.22
	COMMON / CL / CL,COT,CDF,CDP,SEPTRB(2)	BOUND.23
	NUS = 200	BOUND.24
	NBL = 0	BOUND.25
	TRIPS=TRIP(1)	BOUND.26
	THTZ = 0.	BOUND.27
	IF(SANGLE .GT. 0.) 550,575	BOUND.28
550	IF(HTURB .NE. 0.) 575,525	BOUND.29
C	CALCULATE CSTAR TO DETERMINE IF LAMINAR ANALYSIS IS TO BE	BOUND.30
C	PERFORMED. IF SO, USE RTH1 TO OBTAIN STARTING THETA.	BOUND.31
525	CONTINUE	BOUND.32
	CALL INIT(UUD,RTH,HT1)	BOUND.33
	IF(I3D .EQ. 1) 560,570	BOUND.34
560	HTURB = HT1	BOUND.35
	GO TO 571	BOUND.36
570	HTURB = 0.	BOUND.37
571	THTZ = RTH1/(U(1)*RNB)	BOUND.38
	GO TO 1000	BOUND.39
575	IF(THTZ)1000,600,1000	BOUND.40
600	CONTINUE	BOUND.41
700	PKZ = .0855	BOUND.42
	DU(1) = ABS(DU(1))	BOUND.43
900	ZZERO=PKZ/OU(1)	BOUND.44
	ZZ(1)=ZZERO	BOUND.45
	GO TO 1100	BOUND.46
C	CALCULATE L INITIAL Z	BOUND.47
1000	ZZ(1)=THTZ**2*RNB	BOUND.48
1100	CONTINUE	BOUND.49
	IF(HTURB .NE. 0.) 1200,1300	BOUND.50
1200	ITRAN = 1	BOUND.51
	INSTB = 1	BOUND.52
	THT(1) = THTZ	BOUND.53
	IF(MTRAN.EQ.2) MTRAN = 3	BOUND.54
	IF(MTRAN.EQ.3) NUS = 100	BOUND.55
	GO TO 1600	BOUND.56
1300	NLAM=NUS	BOUND.57
	CALL LAMINAR	BOUND.58
1375	CALL TRANSIT(TRIPS)	BOUND.59
	IF(MTRAN.EQ.1) GO TO 1380	BOUND.60
	NF = NFLAP-NFP+1	BOUND.61
	NXT = ITRAN	BOUND.62
	IF(ITRAN.GT.100) NXT = 100	BOUND.63
	IF(X(ITRAN).GT.XTE(NF)) GO TO 1800	BOUND.64
	NUS = 100	BOUND.65
	NXT = NUS	BOUND.66
	MTRAN = 3	BOUND.67
1380	CONTINUE	BOUND.68
	NLAM=ITRAN	BOUND.69
	NBL=ITRAN	BOUND.70

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IF(TE .NE. 0. .OR. NBL .EQ. NUS) GO TO 1800
IF(ISEP .EQ. 1)IF(IATT .EQ. 2)1400,1700
1400 CONTINUE
1600 CALL TURB
1602 NBL=NTURB
IF(MTRAN.EQ.3) GO TO 1800
IF(NBL.LT.NUS) GO TO 1900
IF(NBL.EQ.NUS.AND.H(NUS).GT.3..OR.H(NUS).LT.1.) GO TO 1900
GO TO 1700
1900 CONTINUE
IF(H(NBL).LT.1.) THT(NBL) = 1.1*THT(NBL-1)
IF(H(NBL).LT.1.) H(NBL) = 1.1*H(NBL-1)
IF(RTH(NBL).LT.0.) H(NBL) = 1.1*H(NBL-1)
IF(RTH(NBL).LT.0.) THT(NBL) = 1.1*THT(NBL-1)
DO 2000 I = NBL,NUS
SS = S(I)
H(I) = TBLUI(SS,S,H,1,NBL)
THT(I) = TBLUI(SS,S,THT,1,NBL)
2000 CONTINUE
1700 CONTINUE
1800 CONTINUE
RETURN
END
SUBROUTINE DRAG
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),
1CF2(200),DEL(200),DELSY2(200),DELT(200),H(200),HHDS(200),H1(200),
2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),
3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),
4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)
COMMON / AREA / AREA
DATA TWOPI/6.283185308/
COMMON / NUS / NUS
COMMON / NORDER / DUM2,ALFR,FLAG
COMMON / NBL / NBL
COMMON / INSTB / INSTB,ITRAN
COMMON / CL / CL,CDT,CDF,CDP,SEPTRB(2)
COMMON /CF / CF(200)
COMMON /CD / CDS(200)
COMMON / ISEP / ISEP,ITRIP,IATT,TE
CD=0.
CF(1)=0.
DX=0.
DY=0.
NMI = NBL - 1
CI = CFD(1)
DO 400 I=1,NMI
DDX=X(I+1)-X(I)
DDY=Y(I+1)-Y(I)
DS = S(I+1) - S(I)
CIPL1 = CFD(I+1)
A=(CIPL1 - CI)/DS
B=CI -A*S(I)
DXX=.5*A*(S(I+1)**2-S(I)**2)+B*DS
DINCX = DXX*DDX/DS
DINCY = DXX*DDY/DS
CF(I+1)=DINCY *SIN(ABS(ALFR))+DINCX *COS(ABS(ALFR))+CF(I)
CI = CIPL1
400 CONTINUE
100 DO 200 I = ITRAN,NBL
F1=.5*(H(I)+5.)
IF(H(I).GT.2.6) F1 = 3.8
CDS(I)=2.*THT(I)*U(I)**F1
200 CONTINUE
CD = CDS(NBL)
CDT = CD
CDF = CF(NBL)
CDP=CDT-CDF
RETURN
END
BOUND.71
BOUND.72
BOUND.73
BOUND.74
BOUND.75
BOUND.76
BOUND.77
BOUND.78
BOUND.79
BOUND.80
BOUND.81
BOUND.82
BOUND.83
BOUND.84
BOUND.85
BOUND.86
BOUND.87
BOUND.88
BOUND.89
BOUND.90
BOUND.91
BOUND.92
BOUND.93
DRAG.2
DRAG.3
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DRAG.36
DRAG.37
DRAG.38
DRAG.39
DRAG.40
DRAG.41
DRAG.42
DRAG.43
DRAG.44
DRAG.45
DRAG.46
DRAG.47

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REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

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SUBROUTINE CPOLY( H )
COMMON /RPOLY/ C , D , E , J , DCDH , DDDH , DEDH , DJDH
COMMON / FSOL / RTH, BETA, TB, HDS, HHDS, CF1, F, DGDH
REAL J

HD = (H+1.0)*(H+3.0)*(H+5.0)
D = -16.0/HD
DDDH = 16.0*(3.0*H*H + 18.0*H + 23.0)/(HD*HD)
HE = H*(H+1.0)*(H+2.0)
E = -2.0/HE
DEDH = 2.0*(3.0*H*H + 6.0*H + 2.0)/(HE*HE)
J = E - D
DJDH = DEDH - DDDH
HC = H*(H+1.0)*(H+2.0)*(H+3.0)*(H+4.0)
C = -24.0/HC
DCDH = 24.0*(5.0*H**4 + 40.0*H**3 + 105.0*H**2 + 100.0*H + 24.)
      / (HC*HC)
RETURN
END

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CPOLY.2
CPOLY.3
CPOLY.4
CPOLY.5
CPOLY.6
CPOLY.7
CPOLY.8
CPOLY.9
CPOLY.10
CPOLY.11
CPOLY.12
CPOLY.13
CPOLY.14
CPOLY.15
CPOLY.16
CPOLY.17
CPOLY.18
CPOLY.19
CPOLY.20

```

SUBROUTINE ARC(N,S,U,SINAZ,SINAZ2,SS,US,ALFS)
DIMENSION S(1),SS(1),U(1),US(1),ALFS(1)
SS(1) = 0.
US(1) = SQRT(U(1)*U(1) + SINAZ2)
NM1 = N - 1
ALFS(1) = ASIN(SINAZ/US(1))
DO 100 I=1,NM1
  UT = U(I+1)
  US(I+1) = SQRT(UT*UT+SINAZ2)
  SA = SINAZ/US(I+1)
  ALFS(I+1) = ASIN(SA)
  TA = TAN(ALFS(I+1))
  DS = S(I+1)-S(I)
  SS(I+1) = SS(1) + SQRT(1.+TA*TA)*DS
100 CONTINUE
RETURN
END

```

ARC.2
ARC.3
ARC.4
ARC.5
ARC.6
ARC.7
ARC.8
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ARC.11
ARC.12
ARC.13
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ARC.15
ARC.16
ARC.17
ARC.18

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SUBROUTINE FAT(SS,IND)
COMMON /SCRAT/ ALFS(200),BETA(200),DUM1(3200),S(200),U(200),
1DU(200),DUM2(1000),THT(200)
COMMON / INSTB / INSTB,ITRAN
COMMON / SOLN / Y(3),YP(3)
COMMON / SANGLE / SANGLE
COMMON / RNR / RINF
COMMON / HTURB / HTURS
COMMON / NUS / NUS
EQUIVALENCE ( Y(1),TH ), ( Y(2),P ), ( Y(3),H )
COMMON /USXX/ US , DUS , ALPZ , ALP , K , OAS , KDA
COMMON /FSOL/ RTH , BET , TB , HDS , HHDS , CF1 , F , DGDH
COMMON /RPOLY/ C , D , E , J , DCDH , DDDH , DEDH , DJDH
COMMON /XXXX/ X , DSDX , XW , YW , XS , YS
REAL KDA,K,J

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FAT.2
FAT.3
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FAT.5
FAT.6
FAT.7
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FAT.11
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FAT.24
FAT.25
FAT.26
FAT.27
FAT.28
FAT.29
FAT.30
FAT.31

```

C
C
C
US = TBLU1(SS,S,U,1,NUS)
DUS = TBLU1(SS,S,DU,1,NUS)
WARNING--VARIABLE DUS = (DU/DS)/US, NOT MERELY DU/DS.
DUS = DUS/US
ALP = A SIN( SINAZ/US)
DAS = -SINAZ/(US*COS(ALP))*DUS
K = TAN(ALP)
KDA = K*DAS
RTH = US*TH*RINF
IF(RTH.LT.0.) GO TO 230
Z = ALOG(RTH)
TK1 = 0.01952 - 0.3868*Z + 0.02834*Z*Z - 0.0007*Z*Z*Z
TK2 = 0.19151 - 0.8349*Z + 0.06259*Z*Z - 0.001953*Z*Z*Z

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SUBROUTINE FMAT (N,SS,YY, YYP,IND)
DIMENSION YY(3), YYP(3),CC(4)
COMMON / SOLN / Y(3),YP(3)
EQUIVALENC ( Y(1),TH , , ( Y(2),P ) , ( Y(3),H )
COMMON / MATX/ A(4,4) , B(4) , IPR(3)
COMMON /USXX/ US , DUS , ALPZ , ALP , K , DAS , KDA
COMMON / FSOL/ RTH , BETA , TB , HDS , MHDS , CF1 , F , DGDH
REAL KDA,K,J
C
TH = YY(1)
P = YY(2)
H = YY(3)
CALL ACOE(SS,IND)
IF(IND .EQ. 1) GO TO 300
C
CALL SMLN(A,CC,B,3)
C
YYP(1) =CC(1)
YYP(2) =CC(2)
YYP(3) =CC(3)
300 RETURN
END

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FMAT.2
FMAT.3
FMAT.4
FMAT.5
FMAT.6
FMAT.7
FMAT.8
FMAT.9
FMAT.10
FMAT.11
FMAT.12
FMAT.13
FMAT.14
FMAT.15
FMAT.16
FMAT.17
FMAT.18
FMAT.19
FMAT.20
FMAT.21
FMAT.22
FMAT.23

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SUBROUTINE INIT(U1,RTH1,H1)
DIMENSION U1(1)
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),
1CF2(200),DEL(200),DELST2(200),DELT(200),H(200),MHDS(200),DUM(200),
2PK(200),RDEL(200),RINST9(200),RTRAN(200),PKBAR(200),RTH(200),
3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),
4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)
COMMON / NUS / NUS
DIMENSION CSTART(16),RHTAB(16),HTAB(16)
COMMON/SWEEP/ HH1,RRTH1,KSW
COMMON/SEG/ NCMPT,NFLAP,NFP,NC(66)
COMMON/NSIDE/NSIDE
COMMON / I3D / I3D
DATA NTAB/16/
COMMON / SANGLE / SANGLE
COMMON / RNB / RNB
C
GIVEN A CALCULATED VALUE OF C*, A TABLE SEARCH IS PERFORMED TO
OBTAIN AN INITIAL RTHETA AND H.
C
DATA (HTAB(I), I=1,16) /
1 2.54 .2.54 .2.54 .2.38 .1.78 .1.70
2 1.60 .1.56 .1.54 .1.53 .1.51 .1.50
3 1.47 .1.45 .1.44 .1.43
/
DATA (RHTAB(I), I=1,16) /
1 0. .57.1 .80.88 .100. .200. .245.
2 295. .350. .400. .430. .450. .550.
3 640. .720. .805. .875.
/
DATA (CSTART(I), I=1,16) /
1 0. .2.E4 .4.E4 .6.E4 .8.E4 .1.E5
2 1.2E5 .1.4E5 .1.6E5 .1.8E5 .2.0E5 .2.5E5
3 3.0E5 .3.5E5 .4.E5 .4.5E5
/
GO TO (4,2,4,3,4,3,4,3),NSIDE
3 CONTINUE
IF(NFLAP.GT.0) GO TO 4
GO TO 2
4 CONTINUE
I3D = 0
H1 = 0
PIOV180 = .01745329
V = SIN(SANGLE*PIOV180)
DELX = SUD(2) - SUD(1)
DU1DX = (U1(2) - U1(1))/DELX
CSTAR = (V*V/DU1DX)*RNB
CSTAR = ABS(CSTAR)
IF(CSTAR .GT. 1.3E+05) 50,100
50 I3D = 1

```

```

INIT.2
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INIT.44
INIT.45
INIT.46

```

	H1 = YBLU1(CSTAR,CSTART,HTAB,2,NTAB)	INIT.47
100	RTH1 = YBLU1(CSTAR,CSTART,RHTAB,2,NTAB)	INIT.48
	IF(CSTAR.GT.5.E+05) GO TO 10	INIT.49
	GO TO 20	INIT.50
10	CONTINUE	INIT.51
	H1 = 1.41	INIT.52
	RTH1 = 1000.	INIT.53
20	CONTINUE	INIT.54
	HH1 = H1	INIT.55
	RRTH1 = RTH1	INIT.56
	KSW = I3D	INIT.57
	GO TO 5	INIT.58
2	CONTINUE	INIT.59
	H1 = HH1	INIT.60
	RTH1 = RRTH1	INIT.61
	I3D = KSW	INIT.62
5	CONTINUE	INIT.63
	RETURN	INIT.64
	END	INIT.65
	SUBROUTINE INPUT	INPUT.2
	COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),	INPUT.3
	1CF2(200),DEL(200),DELS12(200),DELT(200),H(200),HKDS(200),H1(200),	INPUT.4
	2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),	INPUT.5
	3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),	INPUT.6
	4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)	INPUT.7
	COMMON/ IPRINT/ IPRINT, KSKIP	INPUT.8
	COMMON / RNR / RNR	INPUT.9
	COMMON / TRIPUL / TRIPUL	INPUT.10
	COMMON / ANGLE / ANGLE	INPUT.11
	COMMON / NUS / NUS	INPUT.12
	COMMON / NPT / NPT	INPUT.13
	COMMON / TRIP / TRIP(2)	INPUT.14
	COMMON / TITLE / TITLE(8)	INPUT.15
	COMMON / NORDER / NORDER,ALFR,FLAG	INPUT.16
	COMMON / TITLEP / TITLEP(24)	INPUT.17
	COMMON/XIN/ XIN(100),YIN(100),CPIN(100),SU(100)	INPUT.18
	DIMENSION UIN(100)	INPUT.19
	COMMON / CL / CL,COT,CDF,CDP,SEPTRB(2)	INPUT.20
	COMMON / HTURB / HTURB	INPUT.21
	COMMON / SANGLE / SANGLE	INPUT.22
	COMMON / SINAZ2 / SINAZ2	INPUT.23
	NUS = 200	INPUT.24
	PI=3.14159265	INPUT.25
	ALFR=ANGLE*PI/180.	INPUT.26
	HTURB = 0.	INPUT.27
	SINAZ = SIN(SANGLE*0.01745329252)	INPUT.28
	SINAZ2 = SINAZ*SINAZ	INPUT.29
	NORDER=1	INPUT.30
	KKK = 1	INPUT.31
	IF(KKK.EQ.1) GO TO 1	INPUT.32
	GO TO 2	INPUT.33
1	CONTINUE	INPUT.34
	DO 3 I = 1,NPT	INPUT.35
	UIN(I) = SQRT(1.-CPIN(I))	INPUT.36
3	CONTINUE	INPUT.37
2	CONTINUE	INPUT.38
	DO 4 I = 1,NPT	INPUT.39
	CPC(I) = 1. - UIN(I)**2	INPUT.40
4	CONTINUE	INPUT.41
	CALL SCHORD(NPT,XIN,YIN,SU)	INPUT.42
	CALL SMOOTH(NPT,SU,UIN,NUS,SUD,UUD,DU)	INPUT.43
	CALL ARC(NUS,SUD,UUD,SINAZ,SINAZ2,S,U,ALFS)	INPUT.44
	CALL SDERV(NPT,SU,UIN,NUS,S,U,DU)	INPUT.45
	DU(1) = ABS(DU(1))	INPUT.46
	DO 10 I = 1,NUS	INPUT.47
	X(I) = YBLU1(SUD(I),SU,XIN,1,NPT)	INPUT.48
	Y(I) = YBLU1(SUD(I),SU,YIN,1,NPT)	INPUT.49
10	CONTINUE	INPUT.50

REPRODUCIBILITY OF THE
ORIGINAL P

```

IF(X(2) .LE. X(1))1100,1400
1100 I=2
1200 IF(X(I+1) .LE. X(I)) 1300,1500
1300 I = I+1
GO TO 1200
1400 I = 1
1500 TRIP(1) = TBLU1(TRIPUP,X(1),SUD(1),1,NUS-I+1)
RETURN
END

```

INPUT.51
INPUT.52
INPUT.53
INPUT.54
INPUT.55
INPUT.56
INPUT.57
INPUT.58
INPUT.59

```

SUBROUTINE INSTAB(N,S,PK,RT,RD,TRIP,TE,ISEP,IATT,IN,IT,RI,PKIN,
1TRIPUP)
COMMON /SCRAT/ SCRAT(5200),THT(200),X(200),Y(200),CPC(200)
COMMON/NSEP/NSEP
COMMON / TRIPUL / TRIPUP,DUM4
COMMON / NUS / NUS
COMMON / INVALK / INVALK
COMMON / NTURB / NTURB
COMMON / ISEP / DUM1,ITRIP,DUM2,DUM3
COMMON / KSEP / KSEP
COMMON / ISTART / ISTART
COMMON / DU2T / DU2T
DIMENSION S(1),PK(1),RT(1),RD(1),RI(1)
IPASS = 1
TRIPX = TRIPUP
IF(TRIPX .EQ. 1.) 400,500
400 CONTINUE
TRIP = S(NUS)
500 IF(KSEP .LT. NUS)600,700
600 KFLAG=1
GO TO 800
700 KFLAG = 2
800 CONTINUE
DO 2400 I=1,N
RLOG = ALOG(RT(I))
IF(RT(I).LE.650.) GO TO 100
PKC = .69412 - .23992*RLOG + .0205*RLOG**2
GO TO 200
100 PKC = - .4709 + .11066*RLOG - .0058591*RLOG**2
200 CONTINUE
IN = I
GO TO (1300,1400),KFLAG
1300 IF(KSEP.EQ.I) 1200,1400
1200 CONTINUE
GO TO 2500
1400 IF(INVALK .EQ. I)1500,1600
1500 WRITE(6,6000)
6000 FORMAT(1H1*LAMINAR SEPARATION*)
GO TO 2500
1600 IF(PKC.GE.PK(I)) GO TO 2800
IF(TRIP .LE. S(IN) .AND. IN .NE. NUS)1800,2400
1800 IF(TRIPUP .EQ. 0.) 2400,1900
1900 IF(RT(I) .GE. 200.) 2000,2100
2000 IT = IN
ITRIP = 1
NSEP = 5
GO TO 3200
2100 DO 2300 II=I,N
IF(RT(II) .GE. 200.) 2200,2300
2200 IT = II
IN = II
ITRIP = 1
NSEP = 5
GO TO 3200
2300 CONTINUE
2400 CONTINUE
NTURB = NUS
TE=1.

```

INSTAB.2
INSTAB.3
INSTAB.4
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INSTAB.57
INSTAB.58
INSTAB.59

```

IT=IN
GO TO 3200
2500 ISEP = 1
IF(KSEP .EQ. 1)GO TO 2600
IF(RT(IN) .LT. 125.) 3500,2575
2575 PKT = .0227-.0007575*RT(IN)-.000001157*RT(IN)*RT(IN)
IF(PKT .GE. PK(IN))GO TO 3300
2600 IATT=2
IT=IN
NSEP = 3
GO TO 3200
2800 CONTINUE
GO TO 2900
3300 CONTINUE
NSEP = 2
2900 IF(IN .EQ. NUS)3200,3000
C IF TRIP . S(IN), SET TRIP EQUAL TO S(IN).
3000 IF(TRIP .LE. S(IN)) 3100,3200
3100 IT = IN
ITRIP = 1
NSEP = 5
3200 CONTINUE
RETURN
END

```

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INSTAB.60
INSTAB.61
INSTAB.62
INSTAB.63
INSTAB.64
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INSTAB.66
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INSTAB.68
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INSTAB.79
INSTAB.80
INSTAB.81
INSTAB.82
INSTAB.83

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```

SUBROUTINE INTBL(IND)
COMMON /SCRAT/ SCRAT(3600),S(200),U(200),DU(200)
COMMON / NUS / NUS
COMMON / NTURB / NTURB
COMMON / INSTB / INSTB,ITRAN
DIMENSION G(3),SCRA(3),TCRA(3)
COMMON /CONTRL/ IEND
COMMON / SOLN / Y(3),YP(3)
EXTERNAL FMAT
S1 = S(I)
S2 = S(I+1)
15 CONTINUE
CALL MERSON(J,S1,S2,Y,FMAT,HEST,HMIN,ALWNC,YP,G,SCRA,TCRA,IND)
I = I + 1
NTURB = I

```

```

INTBL.2
INTBL.3
INTBL.4
INTBL.5
INTBL.6
INTBL.7
INTBL.8
INTBL.9
INTBL.10
INTBL.11
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INTBL.21
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INTBL.24
INTBL.25
INTBL.26
INTBL.27
INTBL.28
INTBL.29
INTBL.30
INTBL.31
INTBL.32

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```

C IF(S(I) .GE. S(NUS))IEND=1
RETURN
C
C ENTRY SETUP
C INITIALIZE SOME TERMS
IND = 0
IEND = 0
HEST = 1.E-05
HMIN = 1.E-08
S2 = 0.0
ALWNC = 1.E-03
I = ITRAN
NTURB = I
RETURN
END

```

```

SUBROUTINE LAMINAR
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CF(200),CF1(200),
ICF2(200),DEL(200),DELST2(200),DELT(200),H(200),HHDS(200),H1(200),
2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTHETA(200),
3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),
4THET22(200),THETA(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)
COMMON / RNR / RNB
COMMON / NUS / N
COMMON / NLAM / NLAM
COMMON / KSFP / KSEP
COMMON / INVALK / INVALK

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LAMINAR.2
LAMINAR.3
LAMINAR.4
LAMINAR.5
LAMINAR.6
LAMINAR.7
LAMINAR.8
LAMINAR.9
LAMINAR.10
LAMINAR.11
LAMINAR.12

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COMMON / ZZ / ZZ(4)
COMMON / DU2T / DU2T
DIMENSION DU2(3),SS(3)
C THE FOLLOWING DATA S. DEFINES COEFFICIENTS FOR THE CUBIC FO
DATA C1/.4140848557 /, C2/-5.6932810302/, C3/6.5043150606 /,
1 C4A/8.550205550/, C4B/55.573995455 /
C THE FOLLOWING DATA S. DEFINES COEFFICIENTS FOR THE CUBIC F1
DATA D1/.04870877648/, D2/.78169607867 /, D3/1.7944503366 /,
1 D4A/2.401088104 /, D4B/-9.1455761599 /
C THE FOLLOWING DATA S. DEFINES COEFFICIENTS FOR THE CUBIC G1
DATA E1/.14979607851/, E2/.98086769883 /, E3/4.1234674158 /,
1 E4A/-13.13432892/, E4B/-10.896754750/
F(Q1,Q2,Q3,Q4,P)= Q4*P*P*P + Q3*P*P + Q2*P + Q1
DF(Q2,Q3,Q4,P) = 3.*Q4*P*P + 2.*Q3*P + Q2
DIMENSION KTAB(24),PF0(24),PF1(24),PG1(24),
1 PKTAB(9),SLTAB(9),HTAB(9)
DATA PKTAB/2.04, 1.05, .52, .25, .20, .14, .12, .10, .08/,
1 SLTAB/1.58, 1.03, .69, .5, .463, .404, .382, .359, .333/,
2 HTAB/1.39, 1.64, 1.88, 2.00, 2.07, 2.18, 2.23, 2.28, 2.34/
REAL MU
REAL KTAB
DATA KTAB / 0.0855, 0.08, 0.07, 0.06, 0.05,
1 0.04, 0.03, 0.02, 0.01, 0.0, -0.01,
2 -0.02, -0.03, -0.04, -0.05, -0.06, -0.07,
3 -0.08, -0.09, -0.10, -0.11, -0.12, -0.13,
4 -0.133/,
5 PF0 / 0.0, 0.0258, 0.0736, 0.1225, 0.1724,
6 0.2236, 0.2761, 0.3299, 0.3848, 0.4411, 0.4986,
7 0.5572, 0.6167, 0.6777, 0.7404, 0.8053, 0.8729,
8 0.9433, 1.0166, 1.0929, 1.1723, 1.2539, 1.3372,
9 1.3686/,
* PF1 / 0.1296, 0.1236, 0.1129, 0.1025, 0.0925,
* 0.0830, 0.0738, 0.0651, 0.0567, 0.0487, 0.0411,
* 0.0338, 0.0270, 0.0207, 0.0149, 0.0095, 0.0048,
* 0.0010, -0.0019, -0.0039, -0.0051, -0.0055, -0.0051,
* -0.0047/,
* PG1 / 0.2626, 0.2535, 0.2377, 0.2228, 0.2087,
* 0.1953, 0.1827, 0.1710, 0.1600, 0.1498, 0.1404,
* 0.1319, 0.1240, 0.1161, 0.1073, 0.0970, 0.0853,
* 0.0728, 0.0601, 0.0470, 0.0335, 0.0197, 0.0054,
* 0.0/
C CURLES METHOD
C NOTATION Z=(THETA/C)**2 * RNB
C INITIAL CONDITIONS
CONST = 5.
ILITE = 1
KSEP = N + 1
INVALK = N + 1
FACT = 2.22
NTAB = 9
NKTAB = 24
ISAV = 0
DO 25 I = 2,50
IF(U(I).LT.0.1) 23,26
23 ISAV = I
25 CONTINUE
26 ISAV = ISAV+1
IF(ISAV.LE.2) GO TO 28
N = N - ISAV + 2
NLAM = N
DO 27 I=2,N
ITEMP = ISAV + I-2
U(I) = U(ITEMP)
DU(I) = DU(ITEMP)
CPC(I) = CPC(ITEMP)
27 CONTINUE
28 SUM = 0.
A = 0.45
GI = 0. $ GINMI = 0.
LAMINAR.13
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LAMINAR.80
LAMINAR.81

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ZSAV	= 1.	LAMINAR.82
Z(1)	= ZZ(1)	LAMINAR.83
PK(1)	= Z(1)* DU(1)	LAMINAR.84
THETA(1)	= SQRT(Z(1)/RNB)	LAMINAR.85
RTHETA(1)	= RNB * U(1) *.THETA(1)	LAMINAR.86
RDEL(1)	= 0.	LAMINAR.87
F1	= TBLU1(PK(1),.KTAB,PF1,3,NKTAB)	LAMINAR.88
SL2	= F1	LAMINAR.89
SL	= SORT(SL2)	LAMINAR.90
CF(1)	= 0.	LAMINAR.91
F	= 0.	LAMINAR.92
IF(DU(1) .EQ. 0.) 50,75		LAMINAR.93
50 H(1)	= 2.554	LAMINAR.94
GO TO 85		LAMINAR.95
75 H(1)	= (SL-2.*PK(1)-F*.5)/PK(1)	LAMINAR.96
85 DEL(1)	= H(1) * THETA(1)	LAMINAR.97
NM1	= N - 1	LAMINAR.98
NM2	= N - 2	LAMINAR.99
UMIN1	= TBLU1(-2.*S(2),S,U,2,N)	LAMINAR.100
U0	= TBLU1(-S(2),S,U,2,N)	LAMINAR.101
U201	= TBLU1(S(N)+S(2),S,U,2,N)	LAMINAR.102
U202	= TBLU1(S(N)+2.*S(2),S,U,2,N)	LAMINAR.103
SS(1)	= 0.	LAMINAR.104
SS(2)	= S(2)	LAMINAR.105
SS(3)	= S(3)	LAMINAR.106
SSOLO	= SS(3)	LAMINAR.107
DU2(1)	= (U(3)-2.*U(1)+UMIN1)/(4.*S(2)**2)	LAMINAR.108
DU2(2)	= (U(4)-2.*U(2)+U0)/(4.*S(2)**2)	LAMINAR.109
DU2(3)	= (U(5)-2.*U(3)+U(1))/(4.*(S(3)-S(2))**2)	LAMINAR.110
C		LAMINAR.111
C	INITIALIZATION ENDED WITH PRECEDING STATEMENT.	LAMINAR.112
C		LAMINAR.113
C		LAMINAR.114
DO 2700 I = 2,N		LAMINAR.115
USIM1	= U(I-1)**5	LAMINAR.116
US1	= USIM1	LAMINAR.117
200 IF(I .EQ. 2) 400,300		LAMINAR.118
C		LAMINAR.119
C		LAMINAR.120
C	CALCULATE NN WHERE NN IS THE NUMBER OF INTEGRATION STEPS TO BE	LAMINAR.121
C	TAKEN IN THE INTERVAL (S(I-1),S(I)).	LAMINAR.122
C		LAMINAR.123
300 NN	= (ABS(DU(I)) + ABS(DU(I-1)))*.5/CONST + 1.	LAMINAR.124
IF(DU(I).GE.0.) NN=1		LAMINAR.125
GO TO 500		LAMINAR.126
400 NN	= 1	LAMINAR.127
500 DSOV2= .5*(S(I)-S(I-1))/FLOAT(NN)		LAMINAR.128
DS	= 2.*DSOV2	LAMINAR.129
C		LAMINAR.130
C		LAMINAR.131
C	THE FOLLOWING DO-LOOP INTEGRATES THE MOMENTUM-INTEGRAL EQUATION	LAMINAR.132
C	FROM S(I-1) TO S(I) IN NN STEPS.	LAMINAR.133
C		LAMINAR.134
DO 1300 KK=1,NN		LAMINAR.135
S2	= S(I-1) + FLOAT(KK)*DS	LAMINAR.136
U2	= TBLU1(S2,S,U,1,N)	LAMINAR.137
US2	= U2**5	LAMINAR.138
DU2T	= TBLU1(S2,SS,DU2,1,3)	LAMINAR.139
DUT	= TBLU1(S2,S,DU,1,N)	LAMINAR.140
700 ITER	= 0	LAMINAR.141
TIM1	= (1. + FACT*GINM1)*US1	LAMINAR.142
800 ITER	= ITER + 1	LAMINAR.143
TI	= (1. + FACT*GI)*US2	LAMINAR.144
900 SUMTEMP	= SUM + (TIM1 * TI)*DSOV2	LAMINAR.145
Z(I)	= A * SUMTEMP / U2**6	LAMINAR.146
IF(Z(I).LT.0.) GO TO 1175		LAMINAR.147
PK(I)	= Z(I)*DUT	LAMINAR.148
IF(PK(I) .LT. -.12) 1000,1100		LAMINAR.149
1000 INVALK = I		LAMINAR.150

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

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IF(Z(I) .LT. 0.) 1010,1020
1010 WRITE(6,6400)I
6400 FORMAT(* INVALID K. Z(*I3*) ) 0.*/ * ANALYSIS IS TERMINATED.*)
GO TO 1175
1020 THETA(I)=SQRT(Z(I)/RNB)
RTHETA(I)=RNB*U(I)*THETA(I)
GO TO 2900
1100 MU = Z(I)**2 * U2 * DU2T
IF(PK(I) .GT. .0855 .AND. KK .EQ. NN) GO TO 2100
F0 = TBLU1(PK(I),KTAB,PF0,1,NKTAB)
G0 = 0.66 + 3.*PK(I)
IF(DU(I).GE.0.) MU = 0.
F = F0 - MU*G0
GI = F - 0.45 + 6.*PK(I)
IF(DU(I).GE.0.) GO TO 1200
IF(ITER.GE.2.AND.ABS(1.-Z(I)/ZSAV).LT..0001) GO TO 1200
ZSAV = Z(I)
IF(ITER.LE.25) GO TO 809
1175 INVALK = I
THETA(I) = THETA(I-1)
RTHETA(I) = RTHETA(I-1)
GO TO 2900
1200 SUM = SUMTEMP
IF(DU(I).GE.0.) GI = 0.
GINMI = GI
US1 = U52
1300 CONTINUE
C
C FOLLOWING EVALUATES H(I),CF(I),DEL(I)
C
1500 IF(Z(I) .LT. 0.) GO TO 1175
THETA(I)=SQRT(Z(I)/RNB)
RTHETA(I)=RNB * U(I) * THETA(I)
F1 = TBLU1(PK(I),KTAB,PF1,1,NKTAB)
G1 = TBLU1(PK(I),KTAB,PG1,1,NKTAB)
IF(DU(I).GE.0.) MU = 0.
SL2 = F1 - MU*G1
IF(SL2 .LE. 0.) GO TO 2800
SL = SQRT(SL2)
CF(I) = 2.*SL/RTHETA(I)
PKT = PK(I)
IF(ABS(PKT) .LT. .01) 1600,1900
1600 IF(PKT .LT. 0.) 1700,1800
1700 H(I) = .5/SQRT(F(D1,D2,D3,D4B,PKT) - MU*F(E1,E2,E3,E4B,PKT))
1 * (DF(D2,D3,D4B,PKT) - MU*DF(E2,E3,E4B,PKT))
2 -.5*(DF(C2,C3,C4B,PKT) - MU*3.) - 2.
GO TO 2000
1800 H(I) = .5/SQRT(F(D1,D2,D3,D4A,PKT) - MU*F(E1,E2,E3,E4A,PKT))
1 * (DF(D2,D3,D4A,PKT) - MU*DF(E2,E3,E4A,PKT))
2 -.5*(DF(C2,C3,C4A,PKT) - MU*3.) - 2.
GO TO 2000
1900 H(I) = (SL-F*.5)/PK(I) -2.
2000 DEL(I) = H(I)*THETA(I)
RDEL(I) = H(I)*RTHETA(I)
GO TO 2200
2100 THETA(I)=SQRT(Z(I)/RNB)
SUM = SUMTEMP
IF(DU(I).GE.0.) GI = 0.
GINMI = GI
US1 = U52
RTHETA(I)= RNB* U(I) * THETA(I)
H(I) = TBLU1(PK(I),PKTAB,HTAB,1,NTAB)
SL = TBLU1(PK(I),PKTAB,SLTAB,1,NTAB)
CF(I) = 2.*SL/RTHETA(I)
DEL(I) = H(I)*THETA(I)
RDEL(I) = H(I)*RTHETA(I)
2200 CONTINUE
SS(I) = S(I)
IF(I.EQ.N) GO TO 2210
LAMINAR.151
LAMINAR.152
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LAMINAR.217
LAMINAR.218
LAMINAR.219

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SS(2) = S(I+1)	LAMINAR.220
SS(3) = S(I+2)	LAMINAR.221
GO TO 2220	LAMINAR.222
2210 SS(2) = S(I) + S(2)	LAMINAR.223
SS(3) = S(I) + S(3)	LAMINAR.224
2220 CONTINUE	LAMINAR.225
GO TO (2250,2250,2700), ILITE	LAMINAR.226
2250 DU2(1) = DU2(2)	LAMINAR.227
DU2(2) = DU2(3)	LAMINAR.228
GO TO (2300,2600), ILITE	LAMINAR.229
2300 IF(I+4 .GT. N) 2500,2400	LAMINAR.230
2400 DU2(3) = (U(I+3)-2.*U(I+2)+ U(I+1))/((S(I+3)-S(I+2))* (S(I+2)-S(I+1)))	LAMINAR.231
GO TO 2700	LAMINAR.232
2500 DU2(3) = (U201-2.*U(N-1)+U(N-3))/(4.*(S(N)-S(N-1))*2)	LAMINAR.233
ILITE = 2	LAMINAR.234
GO TO 2700	LAMINAR.235
2600 DU2(3) = (U202-2.*U(N)+U(N-2))/(4.*(S(N)-S(N-1))*2)	LAMINAR.236
ILITE = 3	LAMINAR.237
2700 CONTINUE	LAMINAR.238
GO TO 2900	LAMINAR.239
2800 KSEP = I	LAMINAR.240
2900 CONTINUE	LAMINAR.241
RETURN	LAMINAR.242
END	LAMINAR.243
	LAMINAR.244

SUBROUTINE MERSON(N,U,Z,Y,FUNC,H,HMIN,E,F,G,S,T,IND)	MERSON.2
DIMENSION Y(1),F(1),G(1),S(1),T(1)	MERSON.3
X = U	MERSON.4
IF(HMIN.LT.0.) HMIN=.01*ABS(H)	MERSON.5
IH=1	MERSON.6
IR=1	MERSON.7
IX=1	MERSON.8
IC=1	MERSON.9
IF(E.GE.1.) IC = 0	MERSON.10
ES = ABS(E)*5.	MERSON.11
IF(Z.GT.X.AND.H.LT.0..OR.Z.LT.X.AND.H.GT.0.) H=-H	MERSON.12
10 IF(IC.EQ.0) GO TO 14	MERSON.13
XS=X	MERSON.14
DO 12 J=1,N	MERSON.15
12 G(J)=Y(J)	MERSON.16
14 HS=H	MERSON.17
Q=X+H-Z	MERSON.18
IE=1	MERSON.19
IF(H.GY.0..AND.Q.GE.0..OR.H.LT.0..AND.Q.LE.0.) GO TO 16	MERSON.20
GO TO 18	MERSON.21
16 H=Z-X	MERSON.22
IR=0	MERSON.23
18 H3=H/3.	MERSON.24
IND = 0	MERSON.25
DO 75 ISW=1,5	MERSON.26
CALL FUNC(N,X,Y,F,IND)	MERSON.27
IF(IND .EQ. 1) GO TO 9999	MERSON.28
DO 70 I=1,N	MERSON.29
Q=H3*F(I)	MERSON.30
GO TO (21,22,23,24,25),ISW	MERSON.31
21 T(I)=Q	MERSON.32
R=Q	MERSON.33
GO TO 26	MERSON.34
22 R=.5*(Q+T(I))	MERSON.35
GO TO 26	MERSON.36
23 R=.3*Q	MERSON.37
S(I)=R	MERSON.38
R=.375*(R+T(I))	MERSON.39
GO TO 26	MERSON.40
24 R=T(I)+4.*Q	MERSON.41
T(I)=R	MERSON.42

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R=1.5*(R-S(I))
GO TO 26
25 R=.5*(Q+T(I))
Q=ABS(2.*R-1.5*(Q+S(I)))
26 Y(I)=G(I)+R
IF(ISW.NE.5) GO TO 70
IF(IC.EQ.0) GO TO 70
R=ABS(Y(I))
IF(R.LY.1.E-03) GO TO 28
R=E5*R
GO TO 30
28 R=E5
30 IF(Q.GE.R.AND.IX.EQ.1) GO TO 32
GO TO 50
32 IR=1
IH=0
H=.5*H
IF(ABS(H).GE.HMIN) GO TO 40
H=SIGN(HMIN,H)
IX=0
40 DO 42 J=1,N
42 Y(J)=G(J)
X=XS
GO TO 14
50 IF(Q.GE..03125*R) IE=0
70 CONTINUE
GO TO (71,75,73,74,75),ISW
71 X=X+H3
GO TO 75
73 X=X+.5*H3
GO TO 75
74 X = X + .5*H
75 CONTINUE
IF(IC.EQ.0) GO TO 80
IF(IE.NE.IH.OR.IF.NE.IR) GO TO 77
H=2.*H
IX=1
77 IH=1
80 CONTINUE
IF(IR.EQ.1) GO TO 10
H=HS
9999 RETURN
END

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MERSON.43
MERSON.44
MERSON.45
MERSON.46
MERSON.47
MERSON.48
MERSON.49
MERSON.50
MERSON.51
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MERSON.83
MERSON.84
MERSON.85

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SUBROUTINE OUTPUT
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CF (200),CF1(200),
1CF2(200),DEL(200),DELST2(200),DELTA(200),H(200),MHOS(200),H1(200),
2PK(200),ROEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),
3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),
4THET22(200),THT(200),DUMMY(3400)
COMMON / SOLN / Y(3),YP(3)
EQUIVALENCE ( Y(1),THETA),( Y(2),P ), ( Y(3),TH)
COMMON /USXX/ US , DUS , ALPZ , ALP , K , CAS , KDA
COMMON /FSQL/TRTH ,TBETA , TB , THOS ,THHOS , TCF1 , F , DGDH
COMMON /RPOLY/ C , D , E , J , DCDH , DDDH , DEOH , DJOH
COMMON /MATX/ A(3,3) , B(3) , IPR(3)
COMMON /XXXX/ X , DSDX , XW , YW , XS , YS
COMMON / NTURB / NTURB
REAL KDA,K,J

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OUTPUT.2
OUTPUT.3
OUTPUT.4
OUTPUT.5
OUTPUT.6
OUTPUT.7
OUTPUT.8
OUTPUT.9
OUTPUT.10
OUTPUT.11
OUTPUT.12
OUTPUT.13
OUTPUT.14
OUTPUT.15
OUTPUT.16
OUTPUT.17
OUTPUT.18
OUTPUT.19
OUTPUT.20
OUTPUT.21
OUTPUT.22
OUTPUT.23
OUTPUT.24
OUTPUT.25

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```

C
C
I = NTURB
ALFS(I) = ALP
H(I) = TH
THT(I) = THETA
CF1(I) = TCF1
MHOS(I) = THHOS
RTH(I) = TRTH

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BETA(I) = TBETA	OUTPUT.26
THET12(I) = P*J	OUTPUT.27
THET21(I) = P*E	OUTPUT.28
THET22(I) = P*C*TB	OUTPUT.29
CF(I) = CF1(I)/COS(BETA(I))	OUTPUT.30
CF2(I) = CF1(I)*TAN(BETA(I))	OUTPUT.31
DELT(I) = THT(I)*HHOS(I)	OUTPUT.32
DEL(I) = THT(I)*H(I)	OUTPUT.33
DELST2(I) = P*D	OUTPUT.34
CD(I) = 2.*THETA*(US *COS(ALFS(I)-ALPZ)) **((TH*5.)/2.)	OUTPUT.35
RETURN	OUTPUT.36
END	OUTPUT.37
SUBROUTINE PRINTER	PRINTER.2
COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CF1(200),	PRINTER.3
1CF2(200),DEL(200),DELST2(200),DELTA(200),H(200),HHOS(200),H1(200),	PRINTER.4
2PK(200),RDEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),	PRINTER.5
3S(200),U(200),DUOS(200),SUD(200),UUD(200),THET12(200),THET21(200),	PRINTER.6
4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)	PRINTER.7
COMMON/TITLE/TITLE(8)	PRINTER.8
COMMON/IPRINT/IPRINT,KSKIP	PRINTER.9
COMMON/NSEP/NSEP	PRINTER.10
COMMON/RNB/RNB	PRINTER.11
COMMON/SANGLE/SANGLE	PRINTER.12
COMMON/CL/CL,CDT,COF,CDP,DUM(2),CM	PRINTER.13
COMMON/NSIDE/NSIDE	PRINTER.14
COMMON / NBL / NBL	PRINTER.15
COMMON/MTRAN/ MTRAN	PRINTER.16
COMMON / INSTB / INSTB,ITRAN	PRINTER.17
COMMON/MSEP/MSEP	PRINTER.18
COMMON/I3D/I3D	PRINTER.19
COMMON/ITR/ITR,ITRMAX	PRINTER.20
WRITE(6,7800)	PRINTER.21
WRITE(6,7900)(TITLE(I),I = 1,8)	PRINTER.22
WRITE(6,6700)	PRINTER.23
WRITE(6,6800) RNB,SANGLE,ITR,NSIDE	PRINTER.24
IF(ITR.GT.1.AND.ITR.LT.ITRMAX) GO TO 50	PRINTER.25
IF(I3D.EQ.1) GO TO 1	PRINTER.26
GO TO 2	PRINTER.27
1 CONTINUE	PRINTER.28
ITRAN = 1	PRINTER.29
GO TO 80	PRINTER.30
2 CONTINUE	PRINTER.31
WRITE(6,6600)	PRINTER.32
WRITE(6,7600)	PRINTER.33
I = 1	PRINTER.34
IF(ITRAN.GE.190) NSEP=6	PRINTER.35
GO TO 15	PRINTER.36
10 I = I + KSKIP	PRINTER.37
15 CONTINUE	PRINTER.38
WRITE(6,6400) I,X(I),S(I),U(I),DUOS(I),H(I),THT(I),	PRINTER.39
1 CFD(I)	PRINTER.40
IF(I.GT.200) I = 200	PRINTER.41
IF(I.GE.197) GO TO 21	PRINTER.42
IF(I.EQ.ITRAN) GO TO 25	PRINTER.43
IF((I + KSKIP).GE.ITRAN) 20,10	PRINTER.44
20 I = ITRAN	PRINTER.45
GO TO 15	PRINTER.46
21 NSEP = 6	PRINTER.47
25 CONTINUE	PRINTER.48
GO TO(60,65,70,80,75,400),NSEP	PRINTER.49
60 WRITE(6,7100)	PRINTER.50
GO TO 80	PRINTER.51
65 WRITE(6,7200)	PRINTER.52
GO TO 400	PRINTER.53
70 WRITE(6,7300)	PRINTER.54
GO TO 80	PRINTER.55
75 WRITE(6,7400)	PRINTER.56
80 CONTINUE	PRINTER.57

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IF(MTRAN.EQ.?) GO TO 400
WRITE(6,6900)
WRITE(6,7700)
I = ITRAN
GO TO 35
30 I = I + KSKIP
35 CONTINUE
BETA(I) = BETA(I)*57.29578049
WRITE(6,6500) I,X(I),S(I),U(I),H(I),DELTA(I),THT(I),BETA(I),
1 RTH(I),CFD(I)
IF(I.EQ.NBL) GO TO 50
IF((I + KSKIP).GE.NBL) 40,30
40 I = NBL
GO TO 35
50 CONTINUE
IF(MTRAN.GE.2) GO TO 400
IF(MSEPR.EQ.1) WRITE(6,7500)
IF(IPRINT.EQ.0.OR.SANGLE.EQ.0.) GO TO 300
IF(ITR.GT.1.AND.ITR.LT.ITRMAX) GO TO 300
WRITE(6,7000)
WRITE(6,6100)
WRITE(6,6000)
WRITE(6,6200)
I = ITRAN
GO TO 110
100 I = I+KSKIP
110 CONTINUE
150 ALFS(I) = ALFS(I)*57.29578049
WRITE(6,6300) I,X(I),S(I),OUDS(I),ALFS(I),DELST2(I),
1 THET12(I),THET21(I),THET22(I),CF1(I)
IF(I .EQ. NBL) GO TO 300
IF((I+KSKIP) .GE. NBL) 200,100
200 I = NRL
GO TO 150
300 CONTINUE
WRITE(6,8000) CL
WRITE(6,8100) CDF
WRITE(6,8200) CDP
WRITE(6,8300) CDT
WRITE(6,8400) CM
400 CONTINUE
RETURN
6000 FORMAT(1H ,3X,*I*6X *X* 9X *S* 9X *DU/DS* 6X *ALPHA*
1 7X *DEL* 11X *THETA* 9X *THETA* 9X *THETA* 10X *CF*)
6100 FORMAT(1H0,55X,1P*)
6200 FORMAT(1H ,55X,*2*15X*12* 12X *21*12X *22* 10X *1* //)
6300 FORMAT(1X,13.2X,2(F6.4,4X),E10.3,3X,F6.2,4X
1 S(E10.3,4X))
6400 FORMAT(1S,2F10.4,5(E12.4,5X))
6500 FORMAT(1S,3X,2(F6.4,4X),F5.3,4X,6(E10.3,4X))
6600 FORMAT(1H0,50X,*LAMINAR BOUNDARY LAYER DEVELOPMENT*/)
6700 FORMAT(1H0,35X,*RE* 9X *SWEEP ANGLE* 9X *ITERATION* 9X *SURFACE*)
6800 FORMAT(1H0,30X,E10.3,5X,E10.3,10X,1S,10X,1S)
6900 FORMAT(1H0,50X,*TURBULENT BOUNDARY LAYER DEVELOPMENT*/)
7000 FORMAT(1H0,50X,*CROSS-FLOW PARAMETERS*)
7100 FORMAT(1H0,5X,*NATURAL TRANSITION*)
7200 FORMAT(1H0,5X,*LAMINAR SEPARATION NO REATTACHMENT*)
7300 FORMAT(1H0,5X,*LAMINAR SEPARATION REATTACHMENT AS TURBULENT
1BOUNDARY LAYER*)
7400 FORMAT(1H0,5X,*BOUNDARY LAYER TRIP*)
7500 FORMAT(1H0,5X,*TURBULENT SEPARATION*)
7600 FORMAT(1H0,2X,*I* 7X *X* 8X *S* 8X *US* 14X *DU/DS* 14X
1 *H* 14X *THETAS* 10X *CFS*/)
7700 FORMAT(1H0,2X,*I* 6X *X* 8X *S* 8X *US* 9X *H* 13X *DELTA* 8X
1 *THETAS* 8X *BETA* 11X *RTHETAS* 9X *CFS*/)
7800 FORMAT(1H0,50X,*INCOMPRESSIBLE BOUNDARY LAYER CALCULATIONS*//)
7900 FORMAT(1H0,50X,8A10)
8000 FORMAT(1H ,5X,26F LIFT COEFFICIENT =,F10.6)
8100 FORMAT(1H ,5X,26F SKIN FRICTION DRAG =,F10.6)
PRINTER.58
PRINTER.59
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PRINTER.123
PRINTER.124
PRINTER.125
PRINTER.126

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REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

8200 FORMAT(1H ,5X,26H PRESSURE DRAG =,F10.6)
 8300 FORMAT(1H ,5X,26H PROFILE DRAG COEFFICIENT =,F10.6)
 8400 FORMAT(1H ,5X,26H MOMENT COEFFICIENT =,F10.6)
 END

PRINTER.127
 PRINTER.128
 PRINTER.129
 PRINTER.130

C SUBROUTINE SCHORD(N,X,Y,S)
 DIMENSION X(1),Y(1),S(1)
 COMPUTE ARC-LENGTH ALONG WALL
 S(1)=0.
 DO 200 I=2,N
 DDX=X(I)-X(I-1)
 DDY=Y(I)-Y(I-1)
 DDS=SQRT (DDX**2+DDY**2)
 200 S(I)=S(I-1)+DDS
 RETURN
 END

SCHORD.2
 SCHORD.3
 SCHORD.4
 SCHORD.5
 SCHORD.6
 SCHORD.7
 SCHORD.8
 SCHORD.9
 SCHORD.10
 SCHORD.11
 SCHORD.12

C SUBROUTINE SMOOTH(N,XX,YY,NOUT,X,S,Y)
 DIMENSION XX(1),YY(1),X(1),Y(1),S(1)
 FNMI=NOUT-1
 NM1 = NOUT-1
 DEL=XX(N)/FNMI
 X(1)=XX(1)
 X(NOUT) = XX(N)
 DEL = (XX(N)-XX(1))/FNMI
 DO 200 I=2,NM1
 200 X(I) = X(I-1)+DEL
 S(1) = YY(1)
 S(NOUT) =YY(N)
 C PERFORM 2ND ORDER LAGRANGE INTERPOLATION.
 DO 300 I=2,NM1
 S(I) = TBLU1(X(I),XX,YY,1,N)
 300 CONTINUE
 RETURN
 ENTRY SDERV
 CALCULATE DERIVATIVES.
 DO 450 I=2,NM1
 Y(I) = ((S(I+1)-S(I))/(X(I+1)-X(I))+(S(I)-S(I-1))/(X(I)-X(I-1))
 1))*.5
 450 CONTINUE
 Y(1) = TBLU1(X(1),X(2),Y(2),1,NOUT-2)
 Y(NOUT) = TBLU1(X(NOUT),X,Y,1,NOUT-1)
 RETURN
 END

SMOOTH.2
 SMOOTH.3
 SMOOTH.4
 SMOOTH.5
 SMOOTH.6
 SMOOTH.7
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 SMOOTH.9
 SMOOTH.10
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 SMOOTH.24
 SMOOTH.25
 SMOOTH.26
 SMOOTH.27
 SMOOTH.28

SUBROUTINE TRANSIT(TRIP)
 COMMON /SCRAT/ ALFS(200),BETA(200),CD(200),CFD(200),CFI(200),
 1CF2(200),DEL(200),DELST2(200),DELT(200),H(200),HHOS(200),M1(200),
 2PK(200),ROEL(200),RINSTB(200),RTRAN(200),PKBAR(200),RTH(200),
 3S(200),U(200),DU(200),SUD(200),UUD(200),THET12(200),THET21(200),
 4THET22(200),THT(200),X(200),Y(200),CPC(200),Z(200),DUMMY(2600)
 COMMON / NUS / NUS
 COMMON / NLAM / NLAM
 COMMON / INSTB / INSTB,ITRAN
 COMMON / HTURB / HTURB
 COMMON / ISEP / ISEP,ITRIP,IATT,TE
 COMMON/NSEP/NSEP
 INSTB=0
 ISEP=0
 ITRIP=0
 IATT=0
 ITRAN=0
 TE=0.
 CALL INSTAB(NLAM,S,PK,RTH,ROEL,TRIP,TE,ISEP,IATT,INSTB,ITRAN,
 1RINSTB,PKINS,TRIPOP)
 IF(INSTB .EQ. NUS) 100,200
 100 ITRAN = NUS
 NSEP= 6

TRANSIT.2
 TRANSIT.3
 TRANSIT.4
 TRANSIT.5
 TRANSIT.6
 TRANSIT.7
 TRANSIT.8
 TRANSIT.9
 TRANSIT.10
 TRANSIT.11
 TRANSIT.12
 TRANSIT.13
 TRANSIT.14
 TRANSIT.15
 TRANSIT.16
 TRANSIT.17
 TRANSIT.18
 TRANSIT.19
 TRANSIT.20
 TRANSIT.21
 TRANSIT.22
 TRANSIT.23
 TRANSIT.24

```

GO TO 600
200 IF(TE) 600,300,600
300 IF(IATT-ISEP) 400,500,500
400 NLAM=INSTB
   ITRAN=INSTB
   GO TO 600
500 INP1=INSTB+1
   CALL TRCALC(NLAM,INP1,S,PK,RTH,TRIP,ITRIP,ISEP,IATT,
1       ITRAN,RTRAN,PKBAR,HTURB,TE)
600 CONTINUE
   RETURN
   END

SUBROUTINE TRCALC(N,INP1,S,PK,RT,TRIP,ITRIP,ISEP,IATT,IT,
1       RTN,PKB,HT,TE)
   DIMENSION S(1),PK(1),RT(1),RD(1),RTN(1),PKB(1)
   COMMON /SCRAT/ SCRAT(5200),THT(200),X(200),Y(200),CPC(200)
   COMMON/NSEP/NSEP
   COMMON / ISTART / ISTART
   COMMON / NUS / NUS
   COMMON / KSEP / KSEP
   COMMON / INVALK / INVALK
   COMMON / DU2T / DU2T
   COMMON/PHIL/IPHIL
   COMMON/ITR/ITR999,ITRM99
   IPASS= 1
   IF(IT.NE.0) 100,200
100 RTN(IT) = RT(IT)
   NSEP = 5
   IF(TRIP.GT.S(IT)) NSEP = 3
   GO TO 2200
200 TE=0.
   SKDX=0.
   IF(KSEP .LT. N) 300,400
300 KFLAG = 1
   GO TO 500
400 KFLAG = 2
500 DO 1600 I = INP1,N
   IT=1
C   TEST FOR SEPERATION
1100 GO TO (1200,1300),KFLAG
1200 IF(KSEP .EQ. 1) 1250,1300
1250 CONTINUE
   GO TO 1800
1300 IF(INVALK .EQ. 1) 1400,1500
1400 CONTINUE
   IF(ITR999.LT.IPHIL)GO TO 1800
   WRITE(6,6000)
6000 FORMAT(1H1*LAMINAR SEPARATION*)
   GO TO 1800
1500 CONTINUE
   DELS=S(I)-S(I-1)
   PKSTAR=.5*(PK(I)+PK(I-1))
   SKDX=SKDX+PKSTAR*DELS
   PKB(I)=SKDX/(S(I)-S(INP1-1))
   RLOG = ALOG(RT(I))
   IF(RT(I).LE.750.) GO TO 600
   IF(RT(I).LE.1100.) GO TO 700
   PKBC = 1.59381 - .45543*RLOG + .032534*RLOG**2
   GO TO 800
600 PKBC = - .0925 + .00007*RT(I)
   GO TO 800
700 PKBC = - .12571 + .000114286*RT(I)
800 CONTINUE
   IF(PKBC.GE.PKB(I)) GO TO 2100
   IF(TRIP-S(I)) 1700,1700,1600
1600 CONTINUE
   TE=1.
   GO TO 2600

```

```

TRANSIT.25
TRANSIT.26
TRANSIT.27
TRANSIT.28
TRANSIT.29
TRANSIT.30
TRANSIT.31
TRANSIT.32
TRANSIT.33
TRANSIT.34
TRANSIT.35
TRANSIT.36

TRCALC.2
TRCALC.3
TRCALC.4
TRCALC.5
TRCALC.6
TRCALC.7
TRCALC.8
TRCALC.9
TRCALC.10
TRCALC.11
TRCALC.12
TRCALC.13
TRCALC.14
TRCALC.15
TRCALC.16
TRCALC.17
TRCALC.18
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TRCALC.21
TRCALC.22
TRCALC.23
TRCALC.24
TRCALC.25
TRCALC.26
TRCALC.27
TRCALC.28
TRCALC.29
TRCALC.30
TRCALC.31
TRCALC.32
TRCALC.33
TRCALC.34
TRCALC.35
TRCALC.36
TRCALC.37
TRCALC.38
TRCALC.39
TRCALC.40
TRCALC.41
TRCALC.42
TRCALC.43
TRCALC.44
TRCALC.45
TRCALC.46
TRCALC.47
TRCALC.48
TRCALC.49
TRCALC.50
TRCALC.51
TRCALC.52
TRCALC.53
TRCALC.54
TRCALC.55
TRCALC.56
TRCALC.57

```

```

1700 ITRIP=1
      NSEP = 5
      RTN(IT) = TBLU1( TRIP, S, RT, 1, N)
      S(IT)=TRIP
      GO TO 2200
1800 ISEP=1
      IF(KSEP .EQ. 1) GO TO 2000
      IF(RT(IT) .LT. 125.) 2600,1950
1950 PKT = .0227-.0007575*RT(IT)-.000001157*RT(IT)*RT(IT)
      IF(PKT .GE. PK(IT)) GO TO 2600
2000 IATT=2
      NSEP = 3
      GO TO 2200
2100 CONTINUE
      NSEP = 1
2200 CONTINUE
      HT = 1.4754/ALOG10(RT (IT)) + .9698
      GO TO 2700
2600 CONTINUE
      NSEP = 2
2700 CONTINUE
      RETURN
      END

```

```

TRCALC.58
TRCALC.59
TRCALC.60
TRCALC.61
TRCALC.62
TRCALC.63
TRCALC.64
TRCALC.65
TRCALC.66
TRCALC.67
TRCALC.68
TRCALC.69
TRCALC.70
TRCALC.71
TRCALC.72
TRCALC.73
TRCALC.74
TRCALC.75
TRCALC.76
TRCALC.77
TRCALC.78
TRCALC.79
TRCALC.80

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```

SUBROUTINE TURB
COMMON/MSEP/MSEP
COMMON / CL / DUM(4),SEPTRB(2)
COMMON / CONTRL/ IEND
MSEP = 0
SEPTRB(1) = 0.
CALL SETUP(IND)
CALL INFAT(SS,IND)
CALL OUTPUT
CALL ISTEP(STEP)
20 CONTINUE
CALL INTBL(IND)
CALL OUTPUT
IF(IND .EQ. 0) 30,21
21 CONTINUE
MSEP = 1
SEPTRB(1) = 1.
GO TO 40
30 IF (IEND .EQ. 0) GO TO 20
40 RETURN
END

```

```

TURB.2
TURB.3
TURB.4
TURB.5
TURB.6
TURB.7
TURB.8
TURB.9
TURB.10
TURB.11
TURB.12
TURB.13
TURB.14
TURB.15
TURB.16
TURB.17
TURB.18
TURB.19
TURB.20
TURB.21
TURB.22

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SUBROUTINE XSTEP(STEP)
COMMON /USXX/ US , DUS , ALPZ , ALP , K , DAS , KDA
COMMON /FSOL/ RTP , BETA , TB , PDS , HMDS , CFI , F , DGDH
COMMON /XXXX/ X , DSOX , XW , YW , XS , YS
REAL KDA,K,J

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```

XSTEP.2
XSTEP.3
XSTEP.4
XSTEP.5
XSTEP.6
XSTEP.7
XSTEP.8
XSTEP.9
XSTEP.10
XSTEP.11
XSTEP.12
XSTEP.13
XSTEP.14
XSTEP.15
XSTEP.16
XSTEP.17
XSTEP.18
XSTEP.19
XSTEP.20
XSTEP.21
XSTEP.22
XSTEP.23
XSTEP.24

```

```

C
FXNEW = COS(ALP + BETA)
FYNEW = SIN(ALP + BETA)
XSNEW = COS(ALP)
YSNEW = SIN(ALP)
XW = XW + STEP*(FXOLD + FXNEW)
YW = YW + STEP*(FYOLD + FYNEW)
XS = XS + STEP*(XSOLD + XSNEW)
YS = YS + STEP*(YSOLD + YSNEW)
FXOLD = FXNEW
FYOLD = FYNEW
XSOLD = XSNEW
YSOLD = YSNEW
RETURN
ENTRY ISTEP
XW = 0.0
YW = 0.0
XS = 0.0

```

```

YS = 0.0
FXOLD = COS(ALP + BETA)
FYOLD = SIN(ALP + BETA)
XSOLD = COS(ALP)
YSOLD = SIN(ALP)
RETURN
END

```

```

XSTEP.25
XSTEP.26
XSTEP.27
XSTEP.28
XSTEP.29
XSTEP.30
XSTEP.31

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                                OVERLAY(FRIS,3,0)
PROGRAM INSPAN
C  THREE DIMENSIONAL INFINITE SWEEP WING BOUNDARY LAYER PROGRAM
C  FINITE DIFFERENCE METHOD USING AN EDDY VISCOSITY METHOD TO
C  CLOSE THE NUMERICAL METHOD
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),OY(25),
1  XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),
2  GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),
3  UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),
4  UTABLE(100),OUDY(100,3),PS(100,3),SP(100,3),THETA(200),
5  DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),
6  UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)
7  A4(100),XTEMP(50),STEMP(50),DUMMY(352)
COMMON /SEG/ NCMPT,NFLAP,NFP,NC(4),THETE(12),NPU(4),NPL(4),JSTG(4)
1  UCU(4),UCL(4),WCU(4),WCL(4),XTE(4),ZTE(4),DELZ(3),NG(3),NPG(4)
COMMON/GEO/ CFI,FI,RTN,UN,UTAU,RO,DELS,THETA1,Z,C,KF,ITER,KL,
1  KYG,KX,JMX
COMMON/GRID/YCP(20),CP(20,30),YGAP
COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINF
COMMON/DENSE/SUD(200),USD(200)
COMMON/FSTART/ CFIN,HIN,THTIN,UTE
COMMON /TITLE/ TITLE(8)
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON /RNB/ RNB
COMMON /NPT/ NPT
COMMON /SANGLE/ SANGLE
COMMON/NXT/NXT
COMMON/ XSTART / XSTART
COMMON/ITR/ITR,ITRMAX
COMMON/UIN/UIN(100)
COMMON/NGRID/NGRID
COMMON/XTRIP/ KCCDE,TRIP
COMMON/XFND/ XFIND(20),NXFIND
COMMON/GAP/ ZGAP(2),SXU(2)
COMMON/KLAM/KLAM
COMMON/BEGIN/ HX,THETA,DELTX,DUX,CFX,DSTARX,UGAP
COMMON/SLOT/HSS(100),TSS(100),DSS(100),CSS(100),USS(100),DTSS(100)
COMMON/CURVES/ R(30,2)
COMMON/NST/NST,MC,NRU
DATA FRIS/4HFRIS/
                                INSPAN.3
                                INSPAN.4
                                INSPAN.5
                                INSPAN.6
                                INSPAN.7
                                INSPAN.8
                                INSPAN.9
                                INSPAN.10
                                INSPAN.11
                                INSPAN.12
                                INSPAN.13
                                INSPAN.14
                                INSPAN.15
                                INSPAN.16
                                INSPAN.17
                                INSPAN.18
                                INSPAN.19
                                INSPAN.20
                                INSPAN.21
                                INSPAN.22
                                INSPAN.23
                                INSPAN.24
                                INSPAN.25
                                INSPAN.26
                                INSPAN.27
                                INSPAN.28
                                INSPAN.29
                                INSPAN.30
                                INSPAN.31
                                INSPAN.32
                                INSPAN.33
                                INSPAN.34
                                INSPAN.35
                                INSPAN.36
                                INSPAN.37
                                INSPAN.38
                                INSPAN.39
                                INSPAN.40
                                INSPAN.41

```

```

C INPUT INITIAL DATA
NF = NFLAP-NFP+1
MC = NCMPT-NFLAP*NF
NST = NPT - NPU(MC) + NPG(MC)
NRU = NPU(MC)
NGRID = NG(NF)
SU(1) = 0.
DO 10 I=2,NPT
DDX = XIN(I) - XIN(I-1)
DDZ = ZIN(I) - ZIN(I-1)
DDS = SQRT(DDX**2 + DDZ**2)
SU(I) = SU(I-1) + DDS
10 CONTINUE
IF(ITR.GT.1) GO TO 16
IF(NF.GT.1) GO TO 16
IF(NXFIND.EQ.0) GO TO 16
DO 17 I = 1,NPT
IF(XIN(I+1).GE.XIN(I)) GO TO 18
17 CONTINUE
18 CONTINUE
NXM = I
NPTM = NPT-NXM+1
DO 19 I = 1,NPTM
IM = I+NXM-1
XTEMP(I) = XIN(IM)
STEMP(I) = SU(IM)
19 CONTINUE
DO 15 I=1,NXFIND
XFIND(I) = TBLU1(XFIND(I),XTEMP,STEMP,1,NPTM)
XFIND(I) = XFIND(I)*REFC
15 CONTINUE
WRITE(6,600) (XFIND(I),I=1,NXFIND)
16 CONTINUE
XSTART = (SU(NST) + SXU(NF))*REFC
YGAP = ZGAP(NF)
TRIP = TRIP*REFC
KLAM = 1
IF(XSTART.GT.TRIP) KLAM = 2
SUD(1) = 0.
DELX = SU(NPT)/199.
DO 20 I = 2,200
SUD(I) = SUD(I-1) + DELX
20 CONTINUE
SS = XSTART/REFC
DELTX = 0.
HX = TBLU1(SS,SUD,HSS,1,NXT)
THETAX = TBLU1(SS,SUD,TSS,1,NXT)
DUX = TBLU1(SS,SUD,DSS,1,NXT)
CFX = TBLU1(SS,SUD,CSS,1,NXT)
UGAP = TBLU1(SS,SUD,USS,1,NXT)
IF(KLAM.EQ.2) DELTX = TBLU1(SS,SUD,DTSS,1,NXT)
DSTARX = HX*THETAX
WRITE(6,601)
WRITE(6,600) XSTART,TRIP
600 FORMAT(1H0,20X,F10.5,20X,F10.5)
601 FORMAT(1H0,25X,*S-START* 20X *FLAP-TRANSITION*)
CALL OVERLAY(FRIS,3,1)
C CALCULATE BOUNDARY LAYER DEVELOPMENT
CALL OVERLAY(FRIS,3,2)
RETURN
END

```

```

INSPAN.42
INSPAN.43
INSPAN.44
INSPAN.45
INSPAN.46
INSPAN.47
INSPAN.48
INSPAN.49
INSPAN.50
INSPAN.51
INSPAN.52
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INSPAN.87
INSPAN.88
INSPAN.89
INSPAN.90
INSPAN.91
INSPAN.92
INSPAN.93
INSPAN.94
INSPAN.95
INSPAN.96
INSPAN.97
INSPAN.98
INSPAN.99
INSPAN.100
INSPAN.101
INSPAN.102

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**REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR**

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OVERLAY (FRIS,3,1)
PROGRAM BOUNDARY
COMMON/ SCRAT / ALFS(200),CRETA(200),Y(100),JY(25),JYT(25),DY(25)
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100)
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100)
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200)
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200)
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100)
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)
7 A4(100),DUMMY(452)
COMMON/ GEO / CFI,HI,RTN,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL
1 KYG,KX,JMX
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON /NPT/ NPT
COMMON /IPRINT/ IPRINT,KSKIP
COMMON /SANGLE/ SANGLE
COMMON /RNB/ RNB
KX = 0
C INPUT DATA.
CALL DATIN(2)
C PRINT-OUT INPUT DATA.
IF (IPRINT.GT.0) CALL DATOUT(1)
100 CALL DATIN(1)
KX = KX+1
CALCLATE INITIAL PROFILE.
CALL VELIN
C PRINTOUT STARTING PROFILE.
IF (IPRINT.GT.0) CALL DATOUT(2)
CALL PCALC
CALL WRITE
RETURN
END

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```

SUBROUTINE DATIN(L)
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25)
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100)
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100)
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200)
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200)
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100)
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)
7 A4(100),DUMMY(452)
COMMON/ GEO / CFI,HI,RTH,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL
1 KYG,KX,JMX
COMMON/NPT/ NPT
COMMON/UIN/UIN(100)
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINF
COMMON/FSTART/ CFIN,HIN,THTIN,UTE
COMMON /RNB/ RNB
DIMENSION IY(11),IYT(11),EY(11),EOD(50),EAMI(50)
DATA (IY(I), I=1,11)/2,6,10,13,16,19,22,25,29,32,41/
DATA (IYT(I), I=1,11)/5,9,12,15,18,21,24,28,31,40,99/
DATA (EY(I), I=1,11)/.0003125,.000625,.00125,.0025,.005,.01,.02,
1.04,.08,.16,.32/
DATA (EOD(I), I=1,50)/.0,.01,.02,.03,.04,.05,.06,.07,.075,.08,.085
1 .09,.095,.1,.105,.11,.115,.12,.125,.13,
2 .135,.14,.145,.15,.155,.16,.165,.17,.175,.18
3 .185,.19,.195,.2,.25,.3,.35,.4,.45,.5,.55,
4 .6,.65,.7,.75,.8,.85,.9,.95,1.0/

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	DATA (EAMI(I),I=1,50)/9*.1...998...9965...995...9935...992...99...988,	DATIN.30
1	.986...9835...981...978...975...972...9695...965,	DATIN.31
2	.9615...958...954...95...946...942...9375...933,	DATIN.32
3	.928...923...869...806...736...659...58...5...42,	DATIN.33
4	.341...263...19...127...077...044...02...006...0/	DATIN.34
C	STANDARD ARRAY	DATIN.35
	KYG = 50	DATIN.36
	DO 1 I=1,11	DATIN.37
	JY(I) = IY(I)	DATIN.38
	JYT(I) = IYT(I)	DATIN.39
	DY(I) = EY(I)	DATIN.40
1	CONTINUE	DATIN.41
	DO 2 I=1,50	DATIN.42
	Y00(I) = EDD(I)	DATIN.43
	GAMI(I) = EAMI(I)	DATIN.44
2	CONTINUE	DATIN.45
	GO TO (50,99), L	DATIN.46
50	CONTINUE	DATIN.47
	UN = RNB*UTE/REFC	DATIN.48
	CFI = CFIN	DATIN.49
	HI = HIN	DATIN.50
	THETA1 = THTIN/REFC	DATIN.51
	DO 10 I=1,NPT	DATIN.52
	UIN(I) = SQRT(1.- CPIN(I))	DATIN.53
10	CONTINUE	DATIN.54
	RTH = THTIN*RNB*UTE	DATIN.55
	RETURN	DATIN.56
99	CONTINUE	DATIN.57
	KL = 11	DATIN.58
	CALCULATE STANDARD Y ARRAY.	DATIN.59
	Y(1)=0.	DATIN.60
	DO 200 K=1,KL	DATIN.61
	KS=JY(K)	DATIN.62
	KF=JYT(K)	DATIN.63
	DO 200 KQ=KS,KF	DATIN.64
200	Y(KQ) = Y(KQ-1)+DY(K)	DATIN.65
	RETURN	DATIN.66
	END	DATIN.67
		DATOUT.2
	SUBROUTINE DATOUT(L)	DATOUT.3
	COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),	DATOUT.4
1	XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),	DATOUT.5
2	GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),	DATOUT.6
3	UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),	DATOUT.7
4	UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),	DATOUT.8
5	DXD(20,30),PPC(20,30),UUC(20,30),UEGGE(100),WP(100),XPG(100),	DATOUT.9
6	UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	DATOUT.10
7	A4(100),DUMMY(452)	DATOUT.11
	COMMON/ GEO / CFI,HI,RTH,UN,UTAU,RO,DELS,THETA1,Z,C,KF,ITER,KL	DATOUT.12
1	KYG,KX,JMX	DATOUT.13
	COMMON/PHIL/IPHIL	DATOUT.14
	COMMON/ITR/ITR999,ITRM99	DATOUT.15
	GO TO (100,200),L	DATOUT.16
100	CONTINUE	DATOUT.17
	IF(ITR999.LT,IPHIL)GO TO 500	DATOUT.18
	WRITE(6,1)	DATOUT.19
	WRITE(6,3) (J,JY(J),JYT(J),DY(J), J=1,KL)	DATOUT.20
	WRITE(6,4) (Y(J), J=1,KF)	DATOUT.21
500	CONTINUE	DATOUT.22
	DO 170 I=1,KYG,10	DATOUT.23
	KA=I	DATOUT.24
	IF(KA*9-KYG)155,155,157	DATOUT.25
155	KB=1+9	DATOUT.26
	GO TO 160	DATOUT.27
157	KB=KYG	DATOUT.28
C	PRINT TABLE OF GAM VS. YDD.	DATOUT.29
160	CONTINUE	DATOUT.30

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IF(KB-KYG)170,180,180
170 CONTINUE
180 CONTINUE
RETURN
200 CONTINUE
IF(ITR999.LT.IPHIL)GO TO 510
WRITE(6,7) ITER
WRITE(6,11)
510 CONTINUE
IF(KF-KYG ) 381,382,383
381 LZ2=1
LZ1=KF
LZ3=KYG
GO TO 384
382 LZ2=3
LZ1=KF+2
LZ3=KF
GO TO 384
383 LZ2=2
LZ1=KYG
LZ3=KF
384 CONTINUE
LZ3 = JMX+2
DO 395 J=1,LZ3
IF(J-LZ1) 391,391,394
391 CONTINUE
KX = 3
IF(ITR999.LT.IPHIL)GO TO 395
WRITE(6,41) YDD(J), GAMI(J), Y(J),YD(J),GAMF(J),U(J,KX)
GO TO 395
394 CONTINUE
GO TO (390,392,384), LZ2
390 CONTINUE
IF(ITR999.LT.IPHIL)GO TO 395
WRITE(6,41) YDD(J), GAMI(J)
GO TO 395
392 CONTINUE
KX = 3
IF(ITR999.LT.IPHIL)GO TO 395
WRITE(6,42) Y(J),YD(J),GAMF(J),U(J,KX)
395 CONTINUE
RETURN
1 FORMAT(1H1,20X,*INSPAN OUTPUT FOR FLAP UPPER SURFACE*//1H0,30X,
1 *INPUT Y GRID*)
3 FORMAT(1H0,4X,1HJ,3X,2HJY,2X,3HJYD,6X,2HDY/(1H ,315,F10.6))
4 FORMAT(1H0, 30X, 17HSTANDARD Y ARRAY./ (1H ,10F10.5)//)
7 FORMAT(1H ,12X,6HINPUTS,15X,24HSTARTING U PROFILE AFTER,13,12H ITEDATOUT.77
IRATIONS.)
11 FORMAT(1H ,6X,4HY/DS,8X,4HGAMI,12X,1HY,11X,4HY/DS,7X,4HGAMF,7X,5HUDATOUT.79
1/UFS)
41 FORMAT(1H ,2F12.4,4X,4F12.4)
42 FORMAT(1H ,2RX,4F12.4)
END
SUBROUTINE PCALC
C SURFACE PRESSURE GRADIENTS AND EFFECTIVE SWEEP ANGLE
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),PCALC.2
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),PCALC.3
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UP(100),UUR(100), PCALC.4
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200), PCALC.5
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200), PCALC.6
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), PCALC.7
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)PCALC.8
7,A4(100),DUMMY(452) PCALC.9
COMMON/UIN/ UIN(100) PCALC.10
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100) PCALC.11
COMMON /NPT/ NPT PCALC.12
COMMON /SANGLE/ SANGLE PCALC.13
PCALC.14
PCALC.15

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COMMON/ XSTART / XSTART
SINAZ = SIN(SANGLE*0.01745329252)
DO 10 I = 1,NPT
ALFS(I) = ATAN(SINAZ/UN(I))
10 CONTINUE
6000 FORMAT(I5,5X,E12.4)
CALL DCPDX(UJN,SU,DU,NPT)
RETURN
END
PCALC.16
PCALC.17
PCALC.18
PCALC.19
PCALC.20
PCALC.21
PCALC.22
PCALC.23
PCALC.24

SUBROUTINE SEARCH(J,KR)
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100),
7,A4(100),DUMMY(452)
COMMON/ GEO / CFI,HI,RTN,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL,
1 KYG,KX,JMX
90 CONTINUE
DY1 = YD(J)-YDD(KR)
IF(ABS(DY1)-1.E-8) 200,200,100
100 IF(DY1) 300,200,150
150 KR=KR+1
IF(KR-KYG) 90,90,900
200 GAMF(J)=GAMI(KR)
RETURN
300 DY3= YDD(KR)-YDD(KR-1)
DY2=YD(J)-YDD(KR-1)
DG = GAMI(KR)-GAMI(KR-1)
GAMF(J) = GAMI(KR-1) + (DG*DY2)/(DY3)
RETURN
900 GAMF(J) = GAMI(KR)
RETURN
END
SEARCH.2
SEARCH.3
SEARCH.4
SEARCH.5
SEARCH.6
SEARCH.7
SEARCH.8
SEARCH.9
SEARCH.10
SEARCH.11
SEARCH.12
SEARCH.13
SEARCH.14
SEARCH.15
SEARCH.16
SEARCH.17
SEARCH.18
SEARCH.19
SEARCH.20
SEARCH.21
SEARCH.22
SEARCH.23
SEARCH.24
SEARCH.25
SEARCH.26
SEARCH.27
SEARCH.28
SEARCH.29

SUBROUTINE VELCAL
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100),
7,A4(100),DUMMY(452)
COMMON/ GEO / CFI,HI,RTH,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL,
1 KYG,KX,JMX
L=1
UTAU = SQRT(CFI/2.)
C ROUTINE TO CALCULATE STARTING PROFILE.
Q = (2.8034 -.8468*ALOG(HI) + .979*ALOG(RTH))
RD = EXP(Q)
DELS = RD/UN
DO 200 J=1,KF
YPL(J) = UTAU*Y(J)*UN
200 CONTINUE
C BEGIN ITERATION LOOP.
ITER = 0
210 CONTINUE
300 ITER = ITER+1
DELS = RD/UN
KR=2
DO 400 J=1,KF
CALCULATE THE STARTING PROFILE
IF(YPL(J)-4.) 330,340,310
310 IF(YPL(J)-30.) 340,340,350
VELCAL.2
VELCAL.3
VELCAL.4
VELCAL.5
VELCAL.6
VELCAL.7
VELCAL.8
VELCAL.9
VELCAL.10
VELCAL.11
VELCAL.12
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VELCAL.22
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VELCAL.27
VELCAL.28
VELCAL.29
VELCAL.30
VELCAL.31

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C LOWER REGION.
330 UT(J) = UTAU*YPL(J)
GO TO 360
C MIDDLE REGION.
340 D = ALOG(YPL(J))
UT(J) = UTAU*(2.3977-2.7048*D + 3.5181*D**2 - .5289*D**3)
GO TO 360
C OUTER REGION.
350 UT(J) = UTAU*(5.4 + 2.389*ALOG(YPL(J)-5.03))
360 CONTINUE
YD(J) = Y(J)/DELS
IF(YD(J)-1.) 370,380,380
CALL ROUTINE FOR GAMMA SEARCH.
370 CALL SEARCH(J,KR)
GO TO 390
380 GAMF(J) = 0.
IF(L.EQ.2) GO TO 10
JMX = J
L=2
10 CONTINUE
390 UP(J)=UT(J)*GAMF(J) + 1.-GAMF(J)
400 CONTINUE
CALCULATE THE BNDRY. LAYER THICKNESS AND MOMENTUM THICKNESS.
DELS = 0.
THETA1 = 0.
DO 500 J=2,KF
DDY = Y(J)-Y(J-1)
DUD = UP(J) + UP(J-1)
DUS = UP(J)**2 + UP(J-1)**2
DELS = DELS + (1.-.5*DUD)*DDY
THETA1= THETA1+.5*(DUD-DUS)*DDY
500 CONTINUE
Z = THETA1*UN
C = (RTH-Z)/RTH
CV= ABS(C)
IF(CV-.001)700,700,600
600 RD = (1.+C)*RD
IF(ITER-25) 210,700,700
700 HI= DELS/THETA1
RETURN
END

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VELCAL.32
VELCAL.33
VELCAL.34
VELCAL.35
VELCAL.36
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VELCAL.38
VELCAL.39
VELCAL.40
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VELCAL.70
VELCAL.71
VELCAL.72

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SUBROUTINE VFLIN
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),VELIN.3
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),VELIN.4
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),VELIN.5
3 UP(100),W(100,3),D(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),VELIN.6
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),VELIN.7
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),VELIN.8
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)VELIN.9
7,A4(100),DUMMY(452)VELIN.10
COMMON/GRID/YCP(20),CP(20,30),YGAPVELIN.11
COMMON/ GEO / CFI,HI,RTN,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL,VELIN.12
1 KYG,KX,JMXVELIN.13
COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UIINVELIN.14
COMMON/FSTART/CFIN,HIN,THIN,UTEVELIN.15
COMMON/SEG/ NCMPT,NFLAP,NFP,NC(66)VELIN.16
COMMON/SANGLE/SANGLEVELIN.17
COMMON/PHIL/TPHILVELIN.18
COMMON/ITR/ITR999,ITRM99VELIN.19
COMMON/KLAM/KLAMVELIN.20
COMMON/RNB/RNBVELIN.21
COMMON/BEGIN/ HX,THETA,X,DELTX,DUX,CFX,DSTARX,UGAPVELIN.22
DIMENSION XC(4,4),R(4),CC(4)VELIN.23
KSWAT = 1VELIN.24
SINAZ = SIN(SANGLE*0.01745329252)VELIN.25
WE = SINAZVELIN.26
YY(1)=0.VELIN.27

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ORIGINAL PAGE IS POOR

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US(1) = 0.
I = 3
UUR(1) = 0.
UR(1) = 0.
U(1,1) = 0.
UEGE(1) = 0.
GAP = 2.
KGAP = INT(GAP)
GO TO (10,20,20),KGAP:
10 CONTINUE
   KKK = 2
   YGAP = 0.
   GO TO 40
20 CONTINUE
   YGAP = YGAP*REFC
C *****
   UPOT = 1.
C
C *****
   DGAP = .333*YGAP
   DTGAP = .667*YGAP
   GO TO(1,2) KLAM
1 CONTINUE
   ITE = 0
   DZ = 6.5*DSTARX
   A = -RNB*DUX/12.
7 ITE = ITE + 1
  DELTX = 10.*DSTARX/(A*DZ**2 + 3.)
  ERR = (DELTX-DZ)/DELTX
  ERRA = ABS(ERR)
  IF(ERRA.LE.0.001) GO TO 8
  DNEW = ABS(DELTX-DZ)
  IF(ITE.LT.2) GO TO 11
  IF(ITE.GE.3) GO TO 14
  IF(DNEW.LE.DOLD) KCON = 1
  IF(DNEW.GT.DOLD) KCON = 2
14 GO TO(11,12),KCON
11 CONTINUE
   DZ = (1.+ERR)*DZ
   GO TO 13
12 CONTINUE
   DZ = (1.-ERR)*DZ
13 CONTINUE
   DOLD = DNEW
   IF(ITE.LT.25) GO TO 7
8 CONTINUE
  DLAMDA = RNB*DUX*DELTX**2
2 CONTINUE
  DLGAP = DELTX*REFC
  WRITE(6,605) DELTX
605 FORMAT(1H0,25X,"BOUNDARY LAYER THICKNESS ON FLAP AT S-START =",
  IF10.5)
  GO TO(5,6) KLAM
6 CONTINUE
  UN = RNB*UGAP/REFC
  CFI = CFX
  HI = HX
  RTN = THETA*X*RNB*UGAP
  CALL VELCAL
5 CONTINUE
  DO 30 J = 2,100
  IF(Y(J).GT.YGAP) GO TO 35
  IF(Y(J).GT.DTGAP) GO TO 32
  IF(Y(J).GT.DLGAP) GO TO 31
  ETA = Y(J)/DLGAP
  GO TO(3,4) KLAM
3 CONTINUE
C CALCULATE LAMINAR PROFILE
  UUR(J) = 1.-(1.+ETA)*(1.-ETA)**3 + DLAMDA*ETA*(1.-ETA)**3/6.

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VELIN.28
VELIN.29
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VELIN.92
VELIN.93
VELIN.94
VELIN.95
VELIN.96

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YY(J) = Y(J)
GO TO 30
4 CONTINUE
UUR(J) = UP(J)
IF(UUR(J).GT.1.) UUR(J) = 1.
YY(J) = Y(J)
GO TO 30
31 CONTINUE
UUR(J) = UPOT
YY(J) = Y(J)
GO TO 30
32 CONTINUE
ETA = (YGAP-Y(J))/DGAP
UUR(J) = ETA**0.14286
YY(J) = Y(J)
30 CONTINUE
35 CONTINUE
KKK = J
KGAP = KGAP - 1
40 CONTINUE
NF = NFLAP-NFP+1
IF(NF.EQ.1) GO TO 41
REWIND 12
READ(12) JMX,(UP(J),Y(J),J=1,JMX)
REWIND 12
IF(IIR999.LT.IPHIL)GO TO 42
WRITE(6,6000) (UP(J),J=1,JMX)
GO TO 42
41 CONTINUE
UN = RNB*UTE/REFC
CFI = CFIN
HI = HIN
RTN = THTIN*RNB*UTE
CALL VELCAL
42 CONTINUE
YMAX = YGAP + Y(JMX+1)
DO 900 J = KKK,100
YY(J) = Y(J-KKK+2) + YGAP
UUR(J) = UP(J-KKK+2)
IF(YY(J).GE.YMAX) GO TO 135
KF=J
900 CONTINUE
135 CONTINUE
N = JYT(KL)
136 CONTINUE
YQ = Y(N)-YY(KF)
IF(YQ) 139,139,137
137 N=N-1
GO TO 136
139 CONTINUE
JMX = N+ 1
C FIX OUTER VALUES.
II1 = N+1
II2 = JYT(KL)
DO 141 JJ=II1,II2
UR(JJ) = UUR(KF)
KYM = JJ
141 CONTINUE
YY(KF+1) = Y(N+1)
YY(KF+2) = Y(N+2)
YY(KF+3) = Y(N+3)
KST = 1
JP = KST-1
KE = JYT(KL)
KKK = N
JP = JP+1
DO 300 J=2,KKK
200 CONTINUE
YS = YY(JP)

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VELIN.97
VELIN.98
VELIN.99
VELIN.100
VELIN.101
VELIN.102
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VELIN.161
VELIN.162
VELIN.163
VELIN.164
VELIN.165

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C SEARCH THE ARRAY.
  YQ2 = YS-Y(J)
  IF(ABS(YQ2)-1.E-9) 909,201,909
909 IF(YQ2) 209,201,204
209 CONTINUE
  JP = JP+1
  GO TO 200
201 CONTINUE
C EXACT SPOT.
  UR(J) = UUR(JP)
  GO TO 220
204 CONTINUE
  DO 210 N=1,4
  KK2 = N+JP-3
  IF(KK2.LT.2) KK2=2
  B(N) = UUR(KK2)
  XC(N,1) = 1.0
  XC(N,2) = YY(KK2)
  XC(N,3) = XC(N,2)**2
  XC(N,4) = XC(N,2)**3
210 CONTINUE
  CALL SMLN(XC,CC,B,4)
  JJ=J
219 CONTINUE
  UR(J) = CC(1)+CC(2)*Y(JJ)+CC(3)*(Y(JJ)**2)+CC(4)*(Y(JJ)**3 )
220 CONTINUE
  KY4 = J-1
300 CONTINUE
  KY4 = JY(KL) -1
  US(1) = 0.
C PERFORM THE SMOOTHING.
  US(2) = UR(2)
  U(2,1) = US(2)
  IF(KSWAT.LE.1) GO TO 500
  DO 320 LT=1,2
  DO 330 J=3,KY4
  IF(LT.EQ.2) GO TO 315
  US(J) = (UR(J-1) + UR(J) + UR(J+1))/3.
  GO TO 330
315 CONTINUE
  U(J,1) = (US(J-1) + US(J) + US(J+1))/3.
330 CONTINUE
  US(KY4+1) = US(KY4)
320 CONTINUE
  GO TO 600
500 CONTINUE
  DO 510 J =3,KY4
  U(J,1) = UR(J)
510 CONTINUE
600 CONTINUE
  U(KY4+1,1) = U(KY4,1)
  DO 400 J=1,20
  YCP(J) = REFC*YCP(J)
  UUC(J) = SQRT(1.-CP(J,1))
400 CONTINUE
  UY1 = TBLU1(DLGAP,YCP,UUC,1,20)
  UY1 = SQRT(UY1**2 + WE**2)
  UY2 = TBLU1(DYGAP,YCP,UUC,1,20)
  UY2 = SQRT(UY2**2 + WE**2)
  DO 410 J=2,JMX
  UEDGE(J) = TRLU1(Y(J),YCP,UUC,1,20)
410 CONTINUE
  DO 450 J=2,JMX
  IF(Y(J).GT.YGAP) GO TO 440
  IF(Y(J).GT.DTGAP) GO TO 430
  IF(Y(J).GT.DLGAP) GO TO 420
  URE = SQRT(UEDGE(JMX)**2 + WE**2)
  U(J,1) = U(J,1)*UY1/URE
  GO TO 450

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VELIN.166
VELIN.167
VELIN.168
VELIN.169
VELIN.170
VELIN.171
VELIN.172
VELIN.173
VELIN.174
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REPRODUCIBILITY OF THE
ORIGINAL PROGRAM, POOR

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420 CONTINUE
   URATIO = SORT(UEDGE(J)**2 + WE**2)/URE
   U(J,I) = U(J,I)*URATIO
   GO TO 450
430 CONTINUE
   U(J,I) = U(J,I)*UY2/URE
   GO TO 450
440 CONTINUE
   U(J,I) = U(J,I)
450 CONTINUE
   IF(ITR999.LT.IPHIL)GO TO 6001
   WRITE(6,6002)
6002 FORMAT(1H0,40X,*INITIAL STREAMWISE VELOCITY PROFILE AT SLOT*)
   WRITE(6,6000) (U(J,3),J=1,JMX)
6000 FORMAT(1H ,10F10.5)
6001 KF = KE
   RETURN
   END

SUBROUTINE WRITE
COMMON/ SCRAT / ALFS(200),DBETA(200),Y(100),JY(25),JYT(25),DY(25),WRITE.2
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),WRITE.3
2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),WRITE.4
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),WRITE.5
4 UTABLE(100),DUOY(100,3),PS(100,3),SP(100,3),THETA(200),WRITE.6
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),WRITE.7
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)WRITE.8
7,A4(100),DUMMY(452)WRITE.9
COMMON/ GEO / CFI,HI,RTN,UN,UTAU,RD,DELS,THETA1,Z,C,KF,ITER,KL,WRITE.11
1 KYG,KX,JMXWRITE.12
COMMON /SANGLE/ SANGLEWRITE.13
COMMON/ XSTART / XSTARTWRITE.14
COMMON/NST/NST,MC,NRUWRITE.15
KL1 = KL+1WRITE.16
KJ = 9999WRITE.17
AE = 1000000.WRITE.18
CBETA = 0.WRITE.19
ALPAN = ALFS(NST)WRITE.20
CBETA = CBETA*.01745329WRITE.21
DO 5 J = 1,10WRITE.22
  BETA(J) = CBETAWRITE.23
5 CONTINUEWRITE.24
DO 10 J= 11,JMXWRITE.25
  BETA(J) = CBETA*(1. - (Y(J) - Y(10))/(Y(JMX) - Y(10)))WRITE.26
10 CONTINUEWRITE.27
  BETA(JMX-2) = .8*BETA(JMX-2)WRITE.28
  BETA(JMX-1) = .5*BETA(JMX-1)WRITE.29
  I = 3WRITE.30
  U(1,I) = 0.WRITE.31
  W(1,I) = 0.WRITE.32
  DO 20 J = JMX,KFWRITE.33
    BETA(J) = BETA(JMX)WRITE.34
20 CONTINUEWRITE.35
  DO 95 J=2,KFWRITE.36
    U(J,I) = U(J,I)*COS(ALPAN + BETA(J))/COS(BETA(J))WRITE.37
    W(J,I) = U(J,I)*SIN(ALPAN + BETA(J))/COS(BETA(J))WRITE.38
95 CONTINUEWRITE.39
  RETURNWRITE.40
  ENDWRITE.41

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                                OVERLAY (FR15,3,2)
PROGRAM DEVELOP
C THIS OVERLAY CALCULATES DOWNSTREAM BOUNDARY LAYER DEVELOPMENT
                                DEVELOP.3
                                DEVELOP.4
                                DEVELOP.5
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),DEVELOP.6
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),DEVELOP.7
2 GAMI(100),GAMF(100),O(200),US(100),YY(100),UR(100),UUR(100),DEVELOP.8
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),DEVELOP.9
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUMMY(200),DEVELOP.10
5 DXD(20,30),PPC(20,30),UUC(20,30),UEEDGE(100),WP(100),XPG(100),DEVELOP.11
6 UPG(100),WC(100),BETA(100),RTAB(50),T(99),DW(99),A3(100),A31(100)DEVELOP.12
7,A4(100),DUNCE(452)DEVELOP.13
COMMON/ GEO / CF1,HI,RTN,UN,UTAX,RO,DELT,THETA1,Z,C,KF,ITER,KL,DEVELOP.14
1 KYG,KX,JOBDEVELOP.15
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)DEVELOP.16
COMMON /NPT/ NPTDEVELOP.17
COMMON/ XSTART / XSTARTDEVELOP.18
COMMON /SANGLE/ SANGLEDEVELOP.19
COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,CF2,XX,GNUDEVELOP.20
COMMON /TITLE/ TITLE(8)DEVELOP.21
DIMENSION X(3),U8(3),CF2(3),P(3)DEVELOP.22
COMMON/SZ3/X,U8DEVELOP.23
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8INDEVELOP.24
COMMON/GRID/YCP(20),CP(20,30),YGAPDEVELOP.25
COMMON/CL/CL,COT,CDF,CDP,DJM(2),CMDEVELOP.26
COMMON/SZ7/KRP2DEVELOP.27
COMMON/ PRESSUR / PDEVELOP.28
COMMON/SZ9/ITRDEVELOP.29
COMMON/SZ14/NPRFDEVELOP.30
COMMON/SZ21/ITRRDEVELOP.31
COMMON/VPRF/WVPRDEVELOP.32
COMMON/SZTBL/XSW,HSVDEVELOP.33
COMMON/ DUBX / DUBXDEVELOP.34
COMMON/DXICR/DXMAXDEVELOP.35
COMMON/XMON/TH2,CF3DEVELOP.36
COMMON/SHAPE/JSP,CNNS,UMX,UMIN,JMN,MCASEDEVELOP.37
COMMON/ CURV1 / R(3)DEVELOP.38
COMMON/PLUB/ NCPX,NCPY,KCP, YDELPDEVELOP.39
COMMON/JAG/LST2DEVELOP.40
COMMON/MARY/OXSDEVELOP.41
COMMON/DELGFD/DDELTDDEVELOP.42
COMMON/PNTOP/KKZDEVELOP.43
COMMON/STAT/PHREF,UREFDEVELOP.44
COMMON/STP/KSTPDEVELOP.45
COMMON/UVEL/UENDDEVELOP.46
COMMON/XTRIP/KCODE,TRIPDEVELOP.47
COMMON/WB/WB(3)DEVELOP.48
COMMON/BLOUT/ HS,THTS,CFSDEVELOP.49
COMMON/SEG/ NCMP,NFLAP,NFP,NC(66)DEVELOP.50
COMMON/ITR/ITRN,ITRMAXDEVELOP.51
COMMON/KSEP/KSEPDEVELOP.52
COMMON/DENSE/ SUD(200),USD(200)DEVELOP.53
COMMON/UIN/UIN(100)DEVELOP.54
COMMON/XTB/XTB(30)DEVELOP.55
COMMON/NGRID/NGRIDDEVELOP.56
COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINFDEVELOP.57
COMMON/RNB/RNBDEVELOP.58
EQUIVALENCE (GW(1),W(2,3))DEVELOP.59
DIMENSION G(99),GW(99)DEVELOP.60
EQUIVALENCE (G(1),U(2,3))DEVELOP.61
REWIND 12DEVELOP.62
JMX = JOBDEVELOP.63
UTAU = UTAXDEVELOP.64
WVPR = 6H NODEVELOP.65
DO 1 I=1,NPTDEVELOP.66
XPG(I) = SU(I)*REFCDEVELOP.67
UPG(I) = UIN(I)DEVELOP.68
1 CONTINUEDEVELOP.69
GNU = UINF*REFC/(12,*RNB)DEVELOP.70

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CALL DATAIN(XSTART)	DEVELOP.71
CALL SETUP2(LPR,XP,LST1,LST2,ITRR,DX1,DX2,CX,JMX,JMX,	DEVELOP.72
IX,XSTART,NPRF,U8,U8IN,P,OU)	DEVELOP.73
R(1)=R(2)=R(3)= 10000000.	DEVELOP.74
KSTP = 2	DEVELOP.75
UEND = U8(3)	DEVELOP.76
C VELOCITY PROFILE INPUT	DEVELOP.77
CALL VINPUT	DEVELOP.78
CALL PRINT(1)	DEVELOP.79
M = 1	DEVELOP.80
LHV = 1	DEVELOP.81
DXS = 0X	DEVELOP.82
DDELTA = 0.	DEVELOP.83
PS(2,3) = -P(3)	DEVELOP.84
90 CONTINUE	DEVELOP.85
LDX = 1	DEVELOP.86
IF((M.EQ.2).AND.(KCP.EQ.1)) GO TO 5346	DEVELOP.87
USURF = U8FNT(X(3),U8IN)	DEVELOP.88
U8(3) = USURF	DEVELOP.89
IF(KWAL.LE.1) U8(3) = USURF/(1.+Y(JMX)/R(3))	DEVELOP.90
5346 CONTINUE	DEVELOP.91
CF3 = CF2(3)	DEVELOP.92
CALL CFCALC(CF2,Y,U,GNU,X,U8 ,AQ)	DEVELOP.93
IF(KSEP.EQ.1) GO TO 5554	DEVELOP.94
CFSQRT = SORT(CF2(3))	DEVELOP.95
UTAU = UMX*CFSQRT	DEVELOP.96
DUDY(1,3) = CF2(2)/AQ	DEVELOP.97
CALCULATE BOUNDARY LAYER THICKNESS.	DEVELOP.98
DELTA = THICK(Y,U,U8,JMX)	DEVELOP.99
CALCULATE REMAINDER OF U PROFILE FROM EDGE OF B.L. TO OUTER LIMITS	DEVELOP.100
IF(KCP.EQ.1) GO TO 11	DEVELOP.101
DO 66 J=JMX,100	DEVELOP.102
U(J,3) = U8(3)	DEVELOP.103
66 CONTINUE	DEVELOP.104
C *****	DEVELOP.105
GO TO 12	DEVELOP.106
11 CONTINUE	DEVELOP.107
JMM = JMX + 3	DEVELOP.108
DO 67 J = JMM,100	DEVELOP.109
U(J,3) = U8(3)	DEVELOP.110
67 CONTINUE	DEVELOP.111
12 CONTINUE	DEVELOP.112
CALCULATE THE DUDY PROFILE.	DEVELOP.113
CALL DERIV(JMX,DELTA,Y,DUDY,U)	DEVELOP.114
164 TH2 = THETA	DEVELOP.115
165 HSV = H	DEVELOP.116
167 KALL = 1	DEVELOP.117
170 GO TO (10,20), KWAL	DEVELOP.118
176 10 CONTINUE	DEVELOP.119
176 R(3) = TBLUI(X(3),XPG,RTAB,1,NPT)	DEVELOP.120
202 R(2) = TPLUI(X(2),XPG,RTAB,1,NPT)	DEVELOP.121
207 20 CONTINUE	DEVELOP.122
CALCULATE THE DISPLACEMENT THICKNESS AND MOMENTUM THICKNESS, AND THE	DEVELOP.123
C SHAPE FACTOR.	DEVELOP.124
207 H = SHAPE(DELTA,THETA,P,Y,U,U8,JMX,X,YYDEL,KALL)	DEVELOP.125
221 IF(H.LT.1.26) H=1.26	DEVELOP.126
225 IF(KCP.EQ.2) GO TO 5573	DEVELOP.127
227 IF(X(3).GT.XSTART) GO TO 5573	DEVELOP.128
233 XPZ = X(3)	DEVELOP.129
234 GO TO (5551,5555), M	DEVELOP.130
242 5551 CONTINUE	DEVELOP.131
242 XPZ = XSTART	DEVELOP.132
244 5555 CONTINUE	DEVELOP.133
CALCULATE THE BOUNDARY-LAYER PRESSURE GRADIENT BASED ON INPUT CP.	DEVELOP.134
244 CALL PFIELD(M,XPZ,P,Y,XTB)	DEVELOP.135
252 U(JMX,2) = U8(3)	DEVELOP.136
253 U(JMX,3) = U8(3)	DEVELOP.137
254 W(JMX,2) = W8(3)	DEVELOP.138
256 W(JMX,3) = W8(3)	DEVELOP.139

M	= 2	DEVELOP.140
5573	CONTINUE	DEVELOP.141
	IF (X(3).GT.XSTART) GO TO 5541	DEVELOP.142
	ITR = 1	DEVELOP.143
	CALL EXTRAP(ITR,JMX,U,X,LPR,UP,U8)	DEVELOP.144
5541	CONTINUE	DEVELOP.145
	CALL YPRESS	DEVELOP.146
	UP(JMX) = U8(3)	DEVELOP.147
	WP(JMX) = W8(3)	DEVELOP.148
	LPR = LSVFN(X,XSTART,LHV,H,HSV,THETA,TH2,CF2,CF3)	DEVELOP.149
	NDEL = 1	DEVELOP.150
	CALL HTYDEL(H,YD,2)	DEVELOP.151
	DO 5553 J = 1,JMX	DEVELOP.152
	UTABLE(J) = U(J,3)	DEVELOP.153
5553	CONTINUE	DEVELOP.154
	UD = TBLU1(YD,YYDEL,UTABLE,2,JMX)	DEVELOP.155
	UD = UMX-UD	DEVELOP.156
	CALL EDDY(GNUT,3,Y,DUDY,P)	DEVELOP.157
	CALL VVEL(V,X,LST2,XSTART,Y,U,GNUT,GNU,P,DUDY,VINT,JMX,U8)	DEVELOP.158
	CALL POUT(INPPF,X,UMX,KRTNN,LST2,ITRR,LN,ITR)	DEVELOP.159
5554	CONTINUE	DEVELOP.160
	CALL RESULT(CF2,JMX,X,1)	DEVELOP.161
	IF(KSEP.EQ.1) KRTNN = 1	DEVELOP.162
	CALL ARRANGE(KRTNN)	DEVELOP.163
	GO TO (75,77), KRTNN	DEVELOP.164
75	CONTINUE	DEVELOP.165
	KALL = 2	DEVELOP.166
	H = SHAPE(DCLS,THETA,P,Y,U,U8,JMX,X,YYDEL,KALL)	DEVELOP.167
	F1 = .5*(HS + 5.)	DEVELOP.168
	USMAX = SQRT(U8(3)**2 + W8(3)**2)	DEVELOP.169
	USINF = U8IN	DEVELOP.170
	UETE = USMAX/USINF	DEVELOP.171
	CDT = 2.*(THTS/REFC)*UETE**F1	DEVELOP.172
	CALL PRINT(10)	DEVELOP.173
	DO 5556 J=1,JMX	DEVELOP.174
	US(J) = US(J)/USMAX	DEVELOP.175
5556	CONTINUE	DEVELOP.176
	NF = NFLAP-NFP*1	DEVELOP.177
	IF(NF.EQ.1) WRITE(12) JMX,(US(J),Y(J),J=1,JMX)	DEVELOP.178
	REWIND 12	DEVELOP.179
	RETURN	DEVELOP.180
77	CONTINUE	DEVELOP.181
7010	CONTINUE	DEVELOP.182
C	IF(X(2)+DX2-XX(KP)) 111,111,109	DEVELOP.183
C 109	X(3) = XX(KP)	DEVELOP.184
C	GO TO 113	DEVELOP.185
111	DX1 = DX2	DEVELOP.186
	X(3) = X(2)+DX1	DEVELOP.187
	IF(KCP.EQ.1) GO TO 5577	DEVELOP.188
	USURF = U8FNT(X(3),UBIN)	DEVELOP.189
	U8(3) = USURF	DEVELOP.190
	IF(KWAL.LE.1) U8(3) = USURF/(1.+Y(JMX)/R(3))	DEVELOP.191
	DUBX = TBLU1(X(3),XPG,DU,1,NPT)	DEVELOP.192
	DUBX = 12.*DUBX*U8IN	DEVELOP.193
	P(3) = USURF*DUBX	DEVELOP.194
	JP2 = JMX + 3	DEVELOP.195
	JL6 = JMX-6	DEVELOP.196
	DO 81 J = 1,JP2	DEVELOP.197
	GO TO (80,82),KWAL	DEVELOP.198
80	UEDGE(J) = USURF/(1.+ Y(J)/R(3))	DEVELOP.199
	GO TO 81	DEVELOP.200
82	UEDGE(J) = UA(3)	DEVELOP.201
81	CONTINUE	DEVELOP.202
	U(JMX+1,3) = UEDGE(JMX+1)	DEVELOP.203
	U(JMX+2,3) = UEDGE(JMX+2)	DEVELOP.204
	GO TO 5578	DEVELOP.205
5577	CONTINUE	DEVELOP.206
	XPZ = X(3)	DEVELOP.207
	CALL PFIELD(M,XPZ,P,Y,XTB)	DEVELOP.208

5578	CONTINUE	DEVELOP.209
113	DX=X(3)-X(2)	DEVELOP.210
	ITR = 1	DEVELOP.211
100	CONTINUE	DEVELOP.212
	NPRF = NPRF+1	DEVELOP.213
C	CALL ROUTINE TO EXAMINE ITERATION COUNTERS CONCERNED WITH INITIAL PROFILE AND INTERMEDIATE PROFILES GENERATED BY THE PROGRAM.	DEVELOP.214
	CALL SPEED(LST2,ITRR,ITR,V,U,JMX,X,Y,LN)	DEVELOP.215
	IF(LOPT.EQ.2) GO TO 5999	DEVELOP.216
	IF(ITR.LE.1) GO TO 6000	DEVELOP.217
5999	CONTINUE	DEVELOP.218
	DELTA = THICK(Y,U,U8,JMX)	DEVELOP.219
	IF(ITR.GY.1) GO TO 6000	DEVELOP.220
	GO TO (30,40), KWAL	DEVELOP.221
30	CONTINUE	DEVELOP.222
	R(3) = TRLU1(X(3),XPG,RTAB,1,NPT)	DEVELOP.223
40	CONTINUE	DEVELOP.224
	IF(KCP.EQ.1) GO TO 6001	DEVELOP.225
	USURF = UBFNT(X(3),UBIN)	DEVELOP.226
	U8(3) = USURF	DEVELOP.227
	IF(KWAL.LE.1) U8(3) = USURF/(1.+Y(JMX)/R(3))	DEVELOP.228
	DUBX = TRLU1(X(3),XPG,DU,1,NPT)	DEVELOP.229
	DUBX = 12.*DUBX*UBIN	DEVELOP.230
	P(3) = USURF*DUBX	DEVELOP.231
	DO 83 J = 1,JP2	DEVELOP.232
	GO TO (84,85),KWAL	DEVELOP.233
84	UEGE(J) = USURF/(1.+Y(J)/R(3))	DEVELOP.234
	GO TO 83	DEVELOP.235
85	UEGE(J) = U8(3)	DEVELOP.236
83	CONTINUE	DEVELOP.237
	U(JMX+1,3) = UEDGE(JMX+1)	DEVELOP.238
	U(JMX+2,3) = UEDGE(JMX+2)	DEVELOP.239
	GO TO 6002	DEVELOP.240
6001	CONTINUE	DEVELOP.241
	XPZ = X(3)	DEVELOP.242
	CALL PFIELD(M,XPZ,P,Y,XTB)	DEVELOP.243
6002	CONTINUE	DEVELOP.244
6000	CONTINUE	DEVELOP.245
	IF(LST2.EQ.1) LPR=1	DEVELOP.246
	CALL EXTRAP(ITR,JMX,U,X,LPR,UP,U8)	DEVELOP.247
	DO 5 J = 2,JMX	DEVELOP.248
	IF(ABS(V(J)),GT,U8(3)*.25) GO TO 6	DEVELOP.249
	GO TO 5	DEVELOP.250
6	CONTINUE	DEVELOP.251
	IF(V(J)) 7,7.8	DEVELOP.252
7	V(J) = -.25*U8(3)	DEVELOP.253
	GO TO 5	DEVELOP.254
8	V(J) = .25*U8(3)	DEVELOP.255
5	CONTINUE	DEVELOP.256
	CALL COFISH	DEVELOP.257
	II = 2	DEVELOP.258
	JJ = 1	DEVELOP.259
	CALL MATRIX(H,G,JMX-1,II,JJ)	DEVELOP.260
C		DEVELOP.261
	IF(SANGLE.EQ.0.)GO TO 9058	DEVELOP.262
C		DEVELOP.263
	CALL MATRIX(QW,GW,JMX-1,II,JJ)	DEVELOP.264
9058	CONTINUE	DEVELOP.265
	GO TO (90,9059), LST2	DEVELOP.266
9059	CONTINUE	DEVELOP.267
	CALL TEST(LN,ITR,1,LST2)	DEVELOP.268
	U(JMX,3) = U8(3)	DEVELOP.269
	W(JMX,3) = W8(3)	DEVELOP.270
	CALL OPTION(LN,LST2,DX2,DX1,DXMAX,ITR,X,LOPT,KRP2,LDX)	DEVELOP.271
	GO TO (90,100,900), LOPT	DEVELOP.272
900	CALL PRINT(4)	DEVELOP.273
	CALL PRINT(2)	DEVELOP.274
	CALL PRINT(4)	DEVELOP.275
	RETURN	DEVELOP.276
	END	DEVELOP.277
		DEVELOP.278

	SUBROUTINE ALI(X,ARG,VAL,Y,NDIM,EPS,IER)	ALI.2
C		ALI.3
C		ALI.4
	DIMENSION ARG(1),VAL(1)	ALI.5
	IER=2	ALI.6
	DELT2=0.	ALI.7
	IF(NDIM-1)9,7,1	ALI.8
		ALI.9
C	START OF AITKEN-LOOP	ALI.10
C	DO 6 J=2,NDIM	ALI.11
1	DELT1=DELT2	ALI.12
	IEND=J-1	ALI.13
	DO 2 I=1,IEND	ALI.14
	H=ARG(I)-ARG(J)	ALI.15
	IF(H)2,13,2	ALI.16
2	VAL(J)=(VAL(I)*(X-ARG(J))-VAL(J)*(X-ARG(I)))/H	ALI.17
	DELT2=ABS(VAL(J)-VAL(IEND))	ALI.18
	IF(J-2)6,6,3	ALI.19
3	IF(DELT2-EPS)10,10,4	ALI.20
4	IF(J-5)6,5,5	ALI.21
5	IF(DELT2-DELT1)6,11,11	ALI.22
6	CONTINUE	ALI.23
C	END OF AITKEN-LOOP	ALI.24
		ALI.25
C		ALI.26
7	J=NDIM	ALI.27
8	Y=VAL(J)	ALI.28
9	RETURN	ALI.29
C		ALI.30
C	THERE IS SUFFICIENT ACCURACY WITHIN NDIM-1 ITERATION STEPS	ALI.31
10	IER=0	ALI.32
	GOTO 8	ALI.33
C		ALI.34
C	TEST VALUE DELT2 STARTS OSCILLATING	ALI.35
11	IER=1	ALI.36
12	J=IEND	ALI.37
	GOTO 8	ALI.38
C		ALI.39
C	THERE ARE TWO IDENTICAL ARGUMENT VALUES IN VECTOR ARG	ALI.40
13	IER=3	ALI.41
	GOTO 12	ALI.42
	END	ALI.42
	SUBROUTINE ARRANGE(KN)	21MAY.81
C	ROUTINE RE ARRANGES BOUNDARY LAYER PARAMETERS FOR INPUT TO SOURCE	21MAY.82
	COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),OY(25),	21MAY.83
1	XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),	21MAY.84
2	GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),	21MAY.85
3	UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),	21MAY.86
4	UTABLE(100),DUOY(100,3),PS(100,3),SP(100,3),THETA(200),	21MAY.87
5	DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	21MAY.88
6	UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	21MAY.89
7	,A4(100),DUMMY(452)	21MAY.90
	COMMON/DENSE/SUD(200),USD(200)	21MAY.91
	COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINF	21MAY.92
	COMMON/BLOUT/HS,THTS,CFS	21MAY.93
	COMMON/NPT/NPT	21MAY.94
	COMMON/SZ3/ X(3),U8(3)	21MAY.95
	COMMON/XSTART/XSTART	21MAY.96
	COMMON/SLOT/HSS(100),TSS(100),DSS(100),CSS(100),USS(100),DTSS(100)	5APR.815
	IF(X(3).EQ.XSTART) K=1	21MAY.97
	IF(K.EQ.1) GO TO 10	21MAY.98
	GO TO 30	21MAY.99
10	CONTINUE	21MAY.100
	NUS = 200	21MAY.101
	SUD(1) = 0.	21MAY.102
	USD(1) = UPG(1)	21MAY.103
	XSUM = 0.	21MAY.104
	DELX = XPG(NPT)/199.	21MAY.105
	K = 2	21MAY.106
	H(1) = HSS(1)	5APR.816

THETA(1) = TSS(1)	5APR.817
CF(1) = CSS(1)	5APR.818
DO 15 I =2,NUS	21MAY.110
SUD(I) = SUD(I-1) + DELX/REFC	21MAY.111
15 CONTINUE	21MAY.112
DO 16 I=2,NUS	21MAY.113
SSUD = SUD(I)*REFC	26APR.72
USD(I) = TBLU1(SSUD,XPG,UPG,1,NPT)	26APR.73
16 CONTINUE	21MAY.115
DO 20 I =2,NUS	21MAY.116
XSUM = XSUM + DELX	21MAY.117
IF(XSUM.GT.X(3)) GO TO 100	21MAY.118
H(I) = HSS(I)	5APR.819
THETA(I) = TSS(I)	5APR.820
CF(I) = CSS(I)	5APR.821
20 CONTINUE	21MAY.122
30 CONTINUE	21MAY.123
IF(KN.EQ.1.AND.X(3).LT.XPG(NPT)) GO TO 90	7JUNE.183
IF(XSUM.GT.X(3)) GO TO 100	21MAY.125
SLOPE = DELX/(X(3)-(XSUM-DELX))	21MAY.126
H(I) = H(I-1) + SLOPE*(HS-H(I-1))	21MAY.127
THETA(I) = THETA(I-1) + SLOPE*(THTS/REFC - THETA(I-1))	21MAY.128
CF(I) = CF(I-1) + SLOPE*(CFS-CF(I-1))	21MAY.129
I = I+1	21MAY.130
XSUM = XSUM + DELX	21MAY.131
IF(KN.EQ.1) GO TO 90	21MAY.132
GO TO 100	21MAY.133
90 CONTINUE	21MAY.134
NBL = I	21MAY.135
HSLOPE = H(I-1) - H(I-2)	21MAY.136
TSLOPE = THETA(I-1) - THETA(I-2)	21MAY.137
DO 95 I =NBL,NUS	21MAY.138
H(I) = H(I-1) + HSLOPE	21MAY.139
THETA(I) = THETA(I-1) + TSLOPE	21MAY.140
95 CONTINUE	21MAY.141
100 CONTINUE	21MAY.142
RETURN	21MAY.143
END	21MAY.144

SUBROUTINE CFCALC(CF2,Y,U,GNU,X,U8,A0)	CFCALC.2
COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25)	CFCALC.3
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),T(100,3),UT(100),V(100)	CFCALC.4
2 GAM1(100),GAMF(100),DM(200),US(100),YY(100),UR(100),UUR(100)	CFCALC.5
3 UP(100),W(100,3),R(400),RW(400),YYDEL(100),GNUT(100,3),DU(200)	CFCALC.6
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUMMY(200)	CFCALC.7
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100)	CFCALC.8
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	CFCALC.9
7,A4(100),DUNCE(452)	CFCALC.10
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)	CFCALC.11
COMMON /NPT/ NPT	CFCALC.12
DIMENSION CF2(3),X(3),U8(3),P(3)	CFCALC.13
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN	CFCALC.14
COMMON/ DUBX / DUBX	CFCALC.15
COMMON/SHAPE/JSP,CNNS,UMX,UMIN,JMN,MCASE	CFCALC.16
COMMON/PRANK/KEY	CFCALC.17
COMMON/ CURV1 / R(3)	CFCALC.18
COMMON/PLUB/ NCPX,NCPY,KCP,YDEL	CFCALC.19
COMMON/ PRESSUR / P	CFCALC.20
COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,DUM,XX,DMM	CFCALC.21
COMMON/KSEP/KSEP	CFCALC.22
DIMENSION Y(100),U(100,3),DUM(3)	CFCALC.23
UMX = U(1,3)	CFCALC.24
JSP = 1	CFCALC.25
KEY = 1	CFCALC.26
DO 60 J=2,JMX	CFCALC.27
UMXS = UMX	CFCALC.28
UMX = AMAX1(UMX,U(J,3))	CFCALC.29
	CFCALC.30

	IF(UMX.NE.UMXS) JSP=J	CFCALC.31
	IF(U(J,3).LE.0.) GO TO 200.	CFCALC.32
	IF(U(J,3)-UMX) 80,60,60	CFCALC.33
60	CONTINUE	CFCALC.34
80	CONTINUE	CFCALC.35
	IF(JSP.LT.(JMX-2)) GO TO 110	CFCALC.36
C	JSP = JMX	CFCALC.37
	CNNS = .999	CFCALC.38
	MCASE = 1	CFCALC.39
	GO TO 120	CFCALC.40
110	CONTINUE	CFCALC.41
	JMN = JSP	CFCALC.42
	UMIN = UMX	CFCALC.43
	DO 115 J=JSP,JMX	CFCALC.44
	UMNS = UMIN	CFCALC.45
	UMIN = AMIN1(UMIN,U(J,3))	CFCALC.46
	IF(UMIN.NE.UMNS) JMN=J	CFCALC.47
	IF(U(J,3)-UMIN) 115,115,116	CFCALC.48
115	CONTINUE	CFCALC.49
C 116	IF(R(3).LE.1.0E+6) GO TO 117	CFCALC.50
116	CONTINUE	CFCALC.51
	IF(JMN.LT.(JMX-1)) GO TO 118	CFCALC.52
C 117	IF(UMIN.LT.U8(3)*.10) GO TO 118	CFCALC.53
	IF(UMIN.GE.UMX*.95) GO TO 121	CFCALC.54
	MCASE = 2	CFCALC.55
	CNNS = 1.001	CFCALC.56
	GO TO 120	CFCALC.57
118	CNNS = .999	CFCALC.58
	MCASE = 3	CFCALC.59
	IF(ABS(UMX-UMIN)/UMX -.0005) 119,119,120	CFCALC.60
119	KEY = 2	CFCALC.61
121	MCASE = 1	CFCALC.62
	CNNS = .999	CFCALC.63
	JSP = JMX	CFCALC.64
	JMN = JMX	CFCALC.65
	UMX = U8(3)	CFCALC.66
120	CONTINUE	CFCALC.67
	AQ = GNU/U8(3)**2	CFCALC.68
	AQ = GNU/(UMX**2)	CFCALC.69
	IF(KCP.EQ.1) GO TO 10	CFCALC.70
	DUBX = TBLU1(X(3),XPG,DU,1,NPT)	CFCALC.71
	DUBX = 12.*DUBX*U8IN	CFCALC.72
	GO TO 20	CFCALC.73
10	CONTINUE	CFCALC.74
	DUBX =-PS(2,3)/U8(3)	CFCALC.75
20	CONTINUE	CFCALC.76
	XA1 = Y(3)*Y(2)/(Y(2)+Y(3))	CFCALC.77
	XA2 = Y(3)*Y(2)*(Y(3)+Y(2))*(Y(2)-Y(3))	CFCALC.78
	CF2(1) = AQ*(2.*U(4,3)-9.*U(3,3) + 18.*U(2,3))/(6.*(Y(2)-Y(1)))	CFCALC.79
	CF2(2) = AQ*(1-U(3,3) + 4.*U(2,3))/(2.*(Y(2)-Y(1)))	CFCALC.80
	CF2(3) = (U(3,3)*Y(2)**3 - U(2,3)*Y(3)**3)/XA2	CFCALC.81
	CF2(3) = CF2(3) + U8(3)*DUBX*XA1/(GNU*288.)	CFCALC.82
	CF2(3) = AQ*CF2(3)	CFCALC.83
	CF2(1) = 12.*CF2(1)	CFCALC.84
	CF2(2) = 12.*CF2(2)	CFCALC.85
	CF2(3) = 12.*CF2(3)	CFCALC.86
	IF(CF2(3)) 200,70,70	CFCALC.87
70	CONTINUE	CFCALC.88
	RETURN	CFCALC.89
200	CONTINUE	CFCALC.90
	CALL PRINT(2)	CFCALC.91
	CALL PRINT(8)	CFCALC.92
	KSEP = 1	CFCALC.93
	RETURN	CFCALC.94
	END	CFCALC.95

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FUNCTION CHEBERF(Y)		
DIMENSION B(28),A(26)		CHEBERF.2
DIMENSION AA(17),BB(19)		CHEBERF.3
DATA AZERO / 3.887303655222904 /		CHEBERF.4
DATA A(1) /-1.381631420019799 /		CHEBERF.5
DATA A(2) / .647316404854584 /		CHEBERF.6
DATA A(3) /-.305931024422036 /		CHEBERF.7
DATA A(4) / .138679747202030 /		CHEBERF.8
DATA A(5) /-.059247456591259 /		CHEBERF.9
DATA A(6) / .236917518249282E-01 /		CHEBERF.10
DATA A(7) /-.884736263524045E-02 /		CHEBERF.11
DATA A(8) / .308566171136092E-02 /		CHEBERF.12
DATA A(9) /-.100638635123798E-02 /		CHEBERF.13
DATA A(10) / .307546328843079E-03 /		CHEBERF.14
DATA A(11) /-.882619837553631E-04 /		CHEBERF.15
DATA A(12) / .238450961660726E-04 /		CHEBERF.16
DATA A(13) /-.607910028505827E-05 /		CHEBERF.17
DATA A(14) / .146597217338083E-05 /		CHEBERF.18
DATA A(15) /-.033515993427206E-05 /		CHEBERF.19
DATA A(16) / .007280579544232E-05 /		CHEBERF.20
DATA A(17) /-.001505791176668E-05 /		CHEBERF.21
DATA A(18) / .000297094742055E-05 /		CHEBERF.22
DATA A(19) /-.000056021273938E-05 /		CHEBERF.23
DATA A(20) / .000010113162390E-05 /		CHEBERF.24
DATA A(21) /-.1750650485E-10 /		CHEBERF.25
DATA A(22) / .0291038139 E-10 /		CHEBERF.26
DATA A(23) /-.0046532645E-10 /		CHEBERF.27
DATA A(24) / .0007164815E-10 /		CHEBERF.28
DATA A(25) /-.0001063749E-10 /		CHEBERF.29
DATA A(26) / .0000152467E-10 /		CHEBERF.30
DATA B(27) / .0 /		CHEBERF.31
DATA B(28) / .0 /		CHEBERF.32
IF (Y.GT.4.0)GO TO 2		CHEBERF.33
X=Y/4.		CHEBERF.34
COEFF=4.*X*X-2.		CHEBERF.35
DO 1 I=1,26		CHEBERF.36
J=27-I		CHEBERF.37
1 B(J)=COEFF*B(J+1)-B(J+2)+A(J)		CHEBERF.38
BZERO=COEFF*B(1)-B(2)+AZERO		CHEBERF.39
CHEBERF=X/2.*(BZERO-B(2))		CHEBERF.40
RETURN		CHEBERF.41
DATA AAZERO / 1.97070527225754 /		CHEBERF.42
DATA AA(1) /-.143397402717750E-01 /		CHEBERF.43
DATA AA(2) / .297361692202619E-03 /		CHEBERF.44
DATA AA(3) /-.980351604336237E-05 /		CHEBERF.45
DATA AA(4) / .043313342034728E-05 /		CHEBERF.46
DATA AA(5) /-.002362150026241E-05 /		CHEBERF.47
DATA AA(6) / .000151549676581E-05 /		CHEBERF.48
DATA AA(7) /-.000011084939856E-05 /		CHEBERF.49
DATA AA(8) / .0904259014E-10 /		CHEBERF.50
DATA AA(9) /-.0080947054E-10 /		CHEBERF.51
DATA AA(10) / .0007853856E-10 /		CHEBERF.52
DATA AA(11) /-.0000817918E-10 /		CHEBERF.53
DATA AA(12) / .90715E-15 /		CHEBERF.54
DATA AA(13) /-.10646E-15 /		CHEBERF.55
DATA AA(14) / .01315E-15 /		CHEBERF.56
DATA AA(15) /-.00170E-15 /		CHEBERF.57
DATA AA(16) / .00023E-15 /		CHEBERF.58
DATA AA(17) /-.00003E-15 /		CHEBERF.59
DATA BB(18) / .0 /		CHEBERF.60
DATA BB(19) / .0 /		CHEBERF.61
2 X=4./Y		CHEBERF.62
COEFF=4.*X*X-2.		CHEBERF.63
DO 3 I=1,17		CHEBERF.64
J=18-I		CHEBERF.65
3 BB(J)=COEFF*BB(J+1)-BB(J+2)+AA(J)		CHEBERF.66
BBZERO=COEFF*BB(1)-BB(2)+AAZERO		CHEBERF.67
CHEBERF=(BBZERO-BB(2))/(2.*Y*EXP(Y*Y)).*564189583547756		CHEBERF.68
RETURN		CHEBERF.69
END		CHEBERF.70
		CHEBERF.71

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SUBROUTINE COFISH
ROUTINE CALCULATES MATRIX COEFFICIENTS
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),
2 GAM(100),GAMF(100),D(200),US(100),YY(100),UR(100),UUR(100),
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUMMY(200),
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),
6 UPG(100),WC(100),BETA(100),RTAB(50),T(99),DW(99),A3(100),A31(100)
7,A4(100),DUNCE(452)
DIMENSION G(99),GW(99)
DIMENSION X(3),U8(3),P(3)
EQUIVALENCE (G(1),U(2,3))
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN
COMMON/SZ3/X,U8
COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,CF2,XX,GNU
COMMON/ PRESSUR / P
COMMON/ CURV1 / R(3)
DIMENSION H1(3),H2(3),H3(3)
COMMON/W8/W8(3)
EQUIVALENCE (GW(1),W(2,3))
RCON = 1.
C A2 = WT*P(3) + (1.-WT)*P(2)
JMX1 = JMX-1
DO 100 J=1,JMX
A3(J) = GNU + GNUT(J,2)
100 CONTINUE
I = 2
DO 110 J=2,JMX
A4(J) = DUY(GNUT,I,J,Y)*12.
110 CONTINUE
DO 900 J=2,JMX1
IF((KWAL.EQ.2).OR.(R(3)/DELTA.GT.1.0E10)) GO TO 202
201 H1(3) = R(3)/(R(3)+Y(J))
H2(3) = 12./(R(3)+Y(J))
H1(2) = R(2)/(R(2)+Y(J))
H2(2) = 12./(R(2)+Y(J))
H3(2) = H2(2)**2
H3(3) = H2(3)**2
GO TO 210
202 H1(3) = 1.
H2(3) = 0.
H1(2) = 1.
H2(2) = 0.
H3(2) = 0.
H3(3) = 0.
210 A1 = (12./(X(3)-X(2)))*(WT*H1(3)*UP(J) + (1.-WT)*H1(I)*
1 U(J,I))
C AW = (12./(X(3)-X(2)))*(WT*H1(3)*WP(J) + (1.-WT)*H1(I)*
C 1 W(J,I))
H33 = WT*H3(3) + (1.-WT)*H3(2)
A31(J) = A3(J) + GNUT(J,2)
A32 = A3(J) - GNU
PS(J,I+1) = PS(J,I) - (P(3)-P(2))
A5 = V(J)
H22 = WT*H2(3) + (1.-WT)*H2(2)
A8 = RCON*H22*A4(J) + (GNU + RCON*A32)*H33
X2 = A1
AW = A1
IF(J-2) 305,305,301
301 IF(J-JMX1) 320,310,310
305 A6 = (Y(J+1)-Y(J-1))/12.
A7 = A6**2/4.
C LOWER BOUNDARY CONDITION.
X1 = A4(J) + (WT*H2(3)+(1.-WT)*H2(2))*A31(J)
X1 = X1/A6 - A5/A6 - A3(J)/A7 - RCON*A32*H22/A6
X3 = A5*H2(3) + 2.*A3(J)/A7 + A8
X4 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X4 = A5/A6 - A3(J)/A7 - X4/A6 + RCON*A32*H22/A6

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X5 = A5*H2(2) + 2.*A3(J)/A7 + A8
C LEFT HAND SIDE.
B(1) = X2 + WT*X3
B(2) = WT*X4
BW(1) = AW + WT*2.*A3(J)/A7
BW(2) = WT*X4
C RIGHT HAND SIDE.
Q0 = 0.
QW0 = 0.
Q1 = 0.
QW1 = 0.
Q2 = X2 - (1.-WT)*X5
QW2 = AW - (1.-WT)*2.*A3(J)/A7
Q3 = -X4*(1.-WT)
QW3 = -(1.-WT)*X4
Q4 = (1.-WT)*H1(2)*PS(J,I) + WT*H1(3)*PS(J,I+1)
QW4 = 0.
GO TO 500
C UPPER BOUNDARY.
C UPPER BOUNDARY CONDITION.
310 GO 312 L=1, LMX
IF(J.EQ.JYT(L)) GO TO 315
312 CONTINUE
A6 = (Y(J+1)-Y(J-1))/12.
A7 = ((Y(J+1)-Y(J))*(Y(J)-Y(J-1)))/144.
JJ = 4*(J-2)-2
X1 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X1 = X1/A6 - A5/A6 - A3(J)/A7 - RCON*A32*H22/A6
C LEFT HAND SIDE (UPPER B.C.)
B(JJ+1) = 0.
BW(JJ+1) = 0.
B(JJ+2) = WT*X1
BW(JJ+2) = WT*X1
C RIGHT HAND SIDE (UPPER B.C.)
Q0 = 0.
QW0 = 0.
Q1 = -(1.-WT)*X1
QW1 = -(1.-WT)*X1
GO TO 317
315 CONTINUE
A6 = (Y(J+1)-Y(J-2))/12.
A7 = ((Y(J+1)-Y(J))*(Y(J)-Y(J-2)))/144.
JJ = 4*(J-2)-2
X1 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X1 = X1/A6 - A5/A6 - A3(J)/A7 - RCON*A32*H22/A6
C LEFT HAND SIDE (UPPER B.C.) WHEN STEPSIZE CHANGES.
B(JJ+1) = WT*X1
BW(JJ+1) = WT*X1
C RIGHT HAND SIDE (UPPER B.C.) WHEN STEP SIZE CHANGES.
B(JJ+2) = 0.
BW(JJ+2) = 0.
Q0 = -(1.-WT)*X1
QW0 = -(1.-WT)*X1
Q1 = 0.
QW1 = 0.
317 CONTINUE
X3 = A5*H2(3) + 2.*A3(J)/A7 + A8
X4 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X4 = A5/A6 - A3(J)/A7 - X4/A6 + RCON*A32*H22/A6
X5 = A5*H2(2) + 2.*A3(J)/A7 + A8
B(JJ+3) = X2 + WT*X3
BW(JJ+3) = AW + WT*2.*A3(J)/A7
Q2 = X2 - (1.-WT)*X5
QW2 = AW - (1.-WT)*2.*A3(J)/A7
Q3 = -X4*(1.-WT)
QW3 = -(1.-WT)*X4
Q4 = (1.-WT)*H1(2)*PS(J,I) + WT*H1(3)*PS(J,I+1)
Q4 = Q4 + U8(3)*WT*X4
QW4 = -W8(3)*WT*X4

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COFISH.71
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COFISH.139

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C R.H.S.
GO TO 500
320 DO 400 L=1,LMX
IF(J.EQ.JYT(L)) GO TO 420
400 CONTINUE
A6 = (Y(J+1)-Y(J-1))/12.
A7 = ((Y(J+1)-Y(J))*(Y(J)-Y(J-1)))/144.
JJ = 4*(J-2)-2
X1 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X1 = X1/A6 - A5/A6 - A3(J)/A7 - RCON*A32*H22/A6
C L.H.S.
B(JJ+1) = 0.
BW(JJ+1) = 0.
B(JJ+2) = WT*X1
BW(JJ+2) = WT*X1
C R.H.S.
Q0 = 0.
QW0 = 0.
Q1 = -(1.-WT)*X1
QW1 = -(1.-WT)*X1
GO TO 450
420 A6 = (Y(J+1)-Y(J-2))/12.
A7 = ((Y(J+1)-Y(J))*(Y(J)-Y(J-2)))/144.
JJ = 4*(J-2)-2
X1 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X1 = X1/A6 - A5/A6 - A3(J)/A7 - RCON*A32*H22/A6
C L.H.S.
B(JJ+1) = WT*X1
BW(JJ+1) = WT*X1
B(JJ+2) = 0.
BW(JJ+2) = 0.
C R.H.S.
Q0 = -(1.-WT)*X1
QW0 = -(1.-WT)*X1
Q1 = 0.
QW1 = 0.
450 CONTINUE
X3 = A5*H2(3) + 2.*A3(J)/A7 + A8
X4 = A4(J) + (WT*H2(3) + (1.-WT)*H2(2))*A31(J)
X4 = A5/A6 - A3(J)/A7 - X4/A6 + RCON*A32*H22/A6
X5 = A5*H2(2) + 2.*A3(J)/A7 + A8
C LEFT HAND SIDE.
B(JJ+3) = X2 + WT*X3
BW(JJ+3) = AW + WT*2.*A3(J)/A7
B(JJ+4) = WT*X4
BW(JJ+4) = WT*X4
C R.H.S.
Q2 = X2 - (1.-WT)*X5
QW2 = AW - (1.-WT)*2.*A3(J)/A7
Q3 = -X4*(1.-WT)
QW3 = -(1.-WT)*X4
Q4 = (1.-WT)*H1(2)*PS(J,I) + WT*H1(3)*PS(J,3)
QW4 = 0.
500 CONTINUE
IF(J-2) 510,510,520
510 QR = 0.
QRW = 0.
GO TO 530
520 QR = Q0*U(J-2,2)
QRW = QW0*W(J-2,2)
530 CONTINUE
G(J-1) = QR + Q1*U(J-1,2) + Q2*U(J,2) + Q3*U(J+1,2) - Q4
GW(J-1) = QRW + QW1*W(J-1,2) + QW2*W(J,2) + QW3*W(J+1,2) + QW4
900 CONTINUE
RETURN
END

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COFISH.140
COFISH.141
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COFISH.201
COFISH.202
COFISH.203
COFISH.204
COFISH.205

REPRODUCIBILITY OF THE
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	SUBROUTINE DATAIN(XSTART)	DATAIN.2
	COMMON/ SCRA1 / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),	DATAIN.3
1	XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),	DATAIN.4
2	GAMI(100),GAMF(100),D(200),US(100),YY(100),UR(100),UUR(100),	DATAIN.5
3	UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),	DATAIN.6
4	UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUMMY(200),	DATAIN.7
5	DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	DATAIN.8
6	UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	DATAIN.9
7	,A4(100),DUNCE(452)	DATAIN.10
	COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)	DATAIN.11
	COMMON /SANGLE/ SANGLE	DATAIN.12
	COMMON/GRID/YCP(20),CP(20,30),YGAP	DATAIN.13
	DIMENSION X(3),UR(3)	DATAIN.14
	COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,UBIN	DATAIN.15
	COMMON/SZ3/X,UB	DATAIN.16
	COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,CF2,XXM,GNU	DATAIN.17
	DIMENSION CF2(3)	DATAIN.18
	COMMON/SZ7/KRP2	DATAIN.19
	COMMON/SZTBL/XSW,HSV	DATAIN.20
	COMMON/ DUBX / DUBX	DATAIN.21
	COMMON/DXICR/DXMAX	DATAIN.22
	COMMON/TQTQ/CONS,GNEQK,KGNO	DATAIN.23
	COMMON/PLUB/ NCPX,NCPY,KCP, YOELP	DATAIN.24
	COMMON/ CURV1 / R(3)	DATAIN.25
	COMMON/STAT/PHREF,UREF	DATAIN.26
	COMMON/PNTOP/KKZ	DATAIN.27
	COMMON/ITR/ITR,ITRMAX	DATAIN.28
	COMMON/NPT/NPT	DATAIN.29
	COMMON/XTB/XTR(30)	DATAIN.30
	COMMON/PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINF	DATAIN.31
	COMMON/NGRID/NGRID	DATAIN.32
	COMMON/NST/NST,MC,NRU	DATAIN.33
	DIMENSION RIN(50)	DATAIN.34
	COMMON/XTRIP/KCODE,TRIP	DATAIN.35
	COMMON/SEG/ NCMPT,NFLAP,NFP,NC(66)	DATAIN.36
	COMMON/CURVES/ RC(30,2)	DATAIN.37
	NF = NFLAP-NFP+1	DATAIN.38
	IF(NF.GT.1) GO TO 20	DATAIN.39
	REWIND 11	DATAIN.40
	KGNO = 1	DATAIN.41
	GO TO 21	DATAIN.42
20	KGNO = 3	DATAIN.43
21	CONTINUE	DATAIN.44
	UTS = 1.	DATAIN.45
	WT = .55	DATAIN.46
	KWAL = 1	DATAIN.47
	NP = 4	DATAIN.48
	CONS = .02	DATAIN.49
	XXM = (SU(NPT) - SU(1))*REFC	DATAIN.50
	XSW = XXM	DATAIN.51
	UBIN = UINF	DATAIN.52
	KRP2 = 1	DATAIN.53
	IF(ITR.GT.1) GO TO 10	DATAIN.54
	READ(5,1) DX,DXMAX,Z,BLTRIP	DATAIN.55
	BLTRIP = BLTRIP*REFC	DATAIN.56
	IF(BLTRIP.LT.TRIP) TRIP = BLTRIP	DATAIN.57
10	CONTINUE	DATAIN.58
	ITRMX = 2	DATAIN.59
	UREF = UBIN	DATAIN.60
	PHREF = 0.	DATAIN.61
	IF(KWAL.NE.1) GO TO 350	DATAIN.62
	IF(ITR.GT.1) GO TO 11	DATAIN.63
	DO 22 I=1,NRU	DATAIN.64
	RIN(I) = ABS(RC(I,NF)*REFC)	DATAIN.65
22	CONTINUE	DATAIN.66
	WRITE(11) DX,DXMAX,Z,BLTRIP,NRU,(RIN(I),I=1,NRU)	DATAIN.67
	GO TO 12	DATAIN.68
11	CONTINUE	DATAIN.69
	READ(11) DX,DXMAX,Z,BLTRIP,NRU,(RIN(I),I=1,NRU)	DATAIN.70

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12 CONTINUE
   KKZ = INT(Z)
   N = NPT-NRU
   IF(N) 2,3,6
2   NN = ABS(N)
   GO TO 4
3   NN = 0
4   DO 5 I =1,NPT
   RTAB(I) = RIN(I+NN)
5   CONTINUE
   GO TO 9
6   DO 7 I =1,N
   RTAB(I) = RIN(I)
7   CONTINUE
   NN = .N+1
   DO 8 I =NN,NPT
   RTAB(I) = RIN(I-NN+1)
8   CONTINUE
9   CONTINUE
350 CONTINUE
   KCP = 1
   NCPX = NGRID
   NCPY = 20
   KCODE = 1
   IF(KCP.GT.1) GO TO 450
   YDELP = YCP(20)
CALCULATE U FROM CP.
   DO 410 I=1,NCPX
   DO 410 J=1,NCPY
   UUC(J,I) = SQRT(1. - CP(J,I)) * UBIN
410 CONTINUE
   DO 420 I=1,NCPX
   XTBI(I) = XPG(I+NST-1)
420 CONTINUE
   CALL DUDS(XTBI,UUC,NCPX,NCPY,DXD)
   DO 430 I=1,NCPX
   DO 430 J=1,NCPY
   PPC(J,I) = * UUC(J,I)*DXD(J,I)*12.
430 CONTINUE
450 CONTINUE
   RETURN
1   FORMAT( 7E10.3)
   END

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DATAIN.71
DATAIN.72
DATAIN.73
DATAIN.74
DATAIN.75
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DATAIN.109
DATAIN.110
DATAIN.111
DATAIN.112
DATAIN.113

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SUBROUTINE DERIV(JMX,DELTA,Y,DUDY,U)
DIMENSION Y(1),DUDY(100,3),U(100,3)
COMMON/SZ1/JJ,LMX
DO 70 J=2,JMX
IF(Y(J)-DELTA) 81,81,82
81 CONTINUE
DUDY(J,3) = DUY(U,3,J,Y)
GO TO 83
82 DUDY(J,3) = 0.
83 CONTINUE
70 CONTINUE
RETURN
END

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DERIV.2
DERIV.3
DERIV.4
DERIV.5
DERIV.6
DERIV.7
DERIV.8
DERIV.9
DERIV.10
DERIV.11
DERIV.12
DERIV.13
DERIV.14

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SUBROUTINE DUDS(XF,SIGF,NT,NY,SIGMF)
DIMENSION XF(50), SIGF(20,20), SIGMF(20,20)
DO 200 J= 1,NY
DO 100 I=1,NT
IF(I.GT.1) GO TO 20
C FIRST POINT. USE FORWARD DIFFERENCES (LAGRANGE).
DX1 = XF(I+1)-XF(I)
DX2 = XF(I+2)-XF(I+1)
DX = DX1 + DX2
DS1 = SIGF(J,I+1) - SIGF(J,I)

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DUDS.2
DUDS.3
DUDS.4
DUDS.5
DUDS.6
DUDS.7
DUDS.8
DUDS.9
DUDS.10
DUDS.11

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DS2	=SIGF(J,I+2) - SIGF(J,I+1)	OUDS.12
A	= DS1*(DX2/DX1*2.)	OUDS.13
B	= DS2*(DX1/DX2)	OUDS.14
SIGMF(J,I)	= (A-B)/DX	OUDS.15
GO TO	100	OUDS.16
20	IF(I.EQ.NT) GO TO 40	OUDS.17
C	ANY OTHER POINT. USE CENTRAL DIFFERENCES.	OUDS.18
DX1	= XF(I) -XF(I-1)	OUDS.19
DX2	= XF(I+1) - XF(I)	OUDS.20
DX	= DX1 + DX2	OUDS.21
DS1	= SIGF(J,I) - SIGF(J,I-1)	OUDS.22
DS2	= SIGF(J,I+1) - SIGF(J,I)	OUDS.23
A	= DS2*DX1/DX2	OUDS.24
B	= DS1*DX2/DX1	OUDS.25
SIGMF(J,I)	= (A+B)/DX	OUDS.26
GO TO	100	OUDS.27
40	CONTINUE	OUDS.28
C	LAST POINT. USE BACKWARD DIFFERENCES.	OUDS.29
DX1	= XF(I-1)-XF(I-2)	OUDS.30
DX2	= XF(I) -XF(I-1)	OUDS.31
DX	= DX1 +DX2	OUDS.32
DS1	= SIGF(J,I-1) - SIGF(J,I-2)	OUDS.33
DS2	= SIGF(J,I) - SIGF(J,I-1)	OUDS.34
A	= DS2*(DX1/DX2 + 2.)	OUDS.35
B	= DS1*(DX2/DX1)	OUDS.36
SIGMF(J,I)	= (A-B)/DX	OUDS.37
100	CONTINUE	OUDS.38
200	CONTINUE	OUDS.39
	RETURN	OUDS.40
	END	OUDS.41

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	FUNCTION DUY(U,I,J,Y)	OUY.2
		OUY.3
	COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),	OUY.4
1	XX(25),YPL(100),YD(100),CF(200),YDD(100),CUM(300),UT(100),V(100),	OUY.5
2	GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),	OUY.6
3	UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),	OUY.7
4	UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),	OUY.8
5	DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	OUY.9
6	UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	OUY.10
7	,A4(100),DUMMY(452)	OUY.11
	DIMENSION Y(100),U(100,3)	OUY.12
	COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN	OUY.13
	IF(J.EQ.1) GO TO 300	OUY.14
	IF(J.EQ.JMX) GO TO 400	OUY.15
	DO 100 L=1,LMX	OUY.16
	KM = JYT(L)	OUY.17
	IF (J.EQ.KM) GO TO 200	OUY.18
100	CONTINUE	OUY.19
	DY = Y(J+1)-Y(J-1)	OUY.20
	DUY = (U(J+1,I)-U(J-1,I))/DY	OUY.21
	RETURN	OUY.22
200	CONTINUE	OUY.23
	DY = Y(J+1)-Y(J-2)	OUY.24
	DUY = (U(J+1,I)-U(J-2,I))/DY	OUY.25
	RETURN	OUY.26
300	CONTINUE	OUY.27
	DY = Y(J+1)-Y(J)	OUY.28
	DUY = (U(J+1,I)-U(J,I))/DY	OUY.29
	RETURN	OUY.30
400	CONTINUE	OUY.31
	DY = Y(J) -Y(J-1)	OUY.32
	DUY = (U(J,I)-U(J-1,I))/DY	OUY.33
	RETURN	OUY.34
	END	OUY.35

	SUBROUTINE EDDY(GNUT,I,Y,DUDY,P)	EDDY.2
C	ROUTINE TO CALCULATE THE EDDY VISCOSITY PROFILE	EDDY.3
	COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),	EDDY.4
	1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),	EDDY.5
	2 GAMI(100),GAMF(100),T(200),US(100),YY(100),UR(100),UUR(100),	EDDY.6
	3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),DUMM(100,3),DU(200),	EDDY.7
	4 UTABLE(100),DUUM(100,3),PS(100,3),SP(100,3),DUMMY(200),	EDDY.8
	5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	EDDY.9
	6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	EDDY.10
	7,A4(100),DUNCE(452)	EDDY.11
	COMMON/ XSTART / XSTART	EDDY.12
	DIMENSION DUDY(100,3), Y(100),GNUT(100,3)	EDDY.13
	COMMON/SZ1/JMX,LMX	EDDY.14
	COMMON/ SZ3 / X(3),U8(3)	EDDY.15
	COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,CF2,XX,GNU	EDDY.16
	DIMENSION CF2(3),P(3)	EDDY.17
	COMMON/SZTBL/XSW,HSV	EDDY.18
	COMMON/SHAPE/JSP,CNNS,UMX,UMIN,JMN,MCASE	EDDY.19
	COMMON/ DUBX / DUBX	EDDY.20
	COMMON/TOTQ/CONS,GNEQK,KGNQ	EDDY.21
	COMMON/PRANK/KEY	EDDY.22
	COMMON/ CURV1 / R(3)	EDDY.23
	COMMON/XTRIP/KCODE,TRIP	EDDY.24
	COMMON/KSEP/KSEP	EDDY.25
	GNUT(1,1) = 0.	EDDY.26
	JOY = 1	EDDY.27
	KSEP = 0	EDDY.28
	RAD = 1.	EDDY.29
	AA = 312.	EDDY.30
	KH = 1	EDDY.31
	DO 7 J = 2,JMX	EDDY.32
	IF(U(J,3))8,8,7	EDDY.33
7	CONTINUE	EDDY.34
	GO TO 9	EDDY.35
8	CALL PRINT(2)	EDDY.36
	KSEP = 1	EDDY.37
	RETURN	EDDY.38
9	CONTINUE	EDDY.39
	IF(X(I)-XSTART) 1,1,2	EDDY.40
1	KAP = 1	EDDY.41
	XLAST = 0.	EDDY.42
	KFLAT = 1	EDDY.43
	KCORE = 1	EDDY.44
2	CONTINUE	EDDY.45
	GNUT4 = 0.	EDDY.46
	IF(X(I)-XSW) 10,20,20	EDDY.47
10	CONTINUE	EDDY.48
	CALL HTYBAR(H,YB,2)	EDDY.49
	CALL HTSIG(H,SIGD,2)	EDDY.50
	GO TO 30	EDDY.51
20	CONTINUE	EDDY.52
	CALL HTYBRE(H,YB,2)	EDDY.53
	CALL HYSIR(H,SIGD,2)	EDDY.54
30	CONTINUE	EDDY.55
	SIGMA = SIGD*DELS/12.	EDDY.56
	DX = X(I)-X(I-1)	EDDY.57
	CGT = 14.5	EDDY.58
	GNUEQ = (UD*SIGMA/CGT)	EDDY.59
	IF(MCASE.GE.2) GNUEQ = 2.*GNUEQ	EDDY.60
	IF(KAP.GE.2) GO TO 6	EDDY.61
	IF(KEY.EQ.2) GO TO 5	EDDY.62
	GO TO 6	EDDY.63
5	GNULT = GNULTB	EDDY.64
	KAP = 2	EDDY.65
6	CONTINUE	EDDY.66
	IF(X(I)-XSTART) 40,40,35	EDDY.67
35	CONTINUE	EDDY.68
	GO TO (36,42,42),MCASE	EDDY.69
36	CONTINUE	EDDY.70

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C   IF (CNNS.GT.1.) GO TO 40
      GNUT2 = (GNULT +CONS*DX*(GNUEQ-GNULT)/DELS)*RAD
      GO TO 45
40  CONTINUE
      GO TO (42,41,42), KGNQ
41  GNUT2 = GNEQK
      GO TO 45
42  GNUT2 = GNUEQ
45  GNULT = GNUT2
      R = 1./(1.41421*SIGD)
      GO TO (49,43,38), MCASE
38  CONTINUE
      UDC = .76*U8(3)
      SIGMAB = .127*DELTA/12.
      GNUEQB = UDC*SIGMAB/CGT*.65
      YBB = .95*DELTA/DELS
      SIGB = 12.*SIGMAB/DELS
      GO TO 39
43  CONTINUE
      UDDN = U(JSP,3)-U(JMX,3)
      URN = U(JMX,3)/UDDN
      CALL UDUNYB(URN,YBB,2)
      YBB = YBB*X(I)/DELS + Y(JSP)/DELS
      IF (R(3).LE.1.0E+6) YBB = YBB + 3.*Y(JSP)/DELS
      CALL UDUNSG(URN,SIGB,2)
      SIGMAB = SIGB*X(I)/12.
      GNUEQB = (UDDN*SIGMAB/CGT)*2.3
39  CONTINUE
      IF (X(I)-XSTART) 47,47,46
46  CONTINUE
      GNUT4 = (GNULTB + 10.*CONS*DX*(GNUEQB-GNULTB)/DELTA)*RAD
      GO TO 48
47  CONTINUE
      GO TO (51,51,52), KGNQ
51  GNUT4 = GNUEQB
      GO TO 48
52  GNUT4 = GNEQK
48  GNULTB = GNUT4
      GNEQK = GNUT4
      B2 = 1./(1.41421*SIGB)
      GO TO (49,37,49), MCASE
37  CONTINUE
      B2 = B2*DELS/X(I)
49  CONTINUE
      DO 300 J=2,JMX
      GO TO (50,70), KP
50  CONTINUE
      AY = UTAU**2
      AZ = -PS(J,3)*Y(J)/12.
      IF (AZ.GT.AY*.5) AZ = .5*AY
      UTTT = SQRT(AY-AZ)
      A = AA*GNU/UTTT
      GNT1 = (.001312)*(1.-EXP(-Y(J)/A))**2
      GNT1 = GNT1*(Y(J)**2)*ABS(DJOY(J,1))**12.
70  CONTINUE
      YD = YYDEL(J)
90  CONTINUE
      ARG = B*(YD-YB)
      GO TO (71,72,72), MCASE
72  CONTINUE
      ARG2 = B2*(YD-YBB)
71  CONTINUE
      IF (ABS(ARG).GT.27.) GO TO 91
      GAMMA = .5*(1.-CHEBERF(ARG))
      GO TO 93
91  GAMMA = 1.
93  CONTINUE
      GO TO (96,82,82), MCASE
82  CONTINUE

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EDDY.71
EDDY.72
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EDDY.125
EDDY.126
EDDY.127
EDDY.128
EDDY.129
EDDY.130
EDDY.131
EDDY.132
EDDY.133
EDDY.134
EDDY.135
EDDY.136
EDDY.137
EDDY.138
EDDY.139

	IF (ABS(ARG2).GT.27.) GO TO 94	EDDY.140
	GAMMA2 = .5*(1.-CHEBERF(ARG2))	EDDY.141
	GO TO 96	EDDY.142
94	GAMMA2 = 1.	EDDY.143
96	CONTINUE	EDDY.144
98	CONTINUE	EDDY.145
	GNUTA = GNUT4	EDDY.146
	GO TO (83,84,84), MCASE	EDDY.147
84	CONTINUE	EDDY.148
	GNUTA = GNUT2	EDDY.149
	GNUTB = GNUT4	EDDY.150
	GO TO 85	EDDY.151
83	CONTINUE	EDDY.152
	GNUTA = GNUT2 * GAMMA	EDDY.153
85	CONTINUE	EDDY.154
95	CONTINUE	EDDY.155
	GO TO (97,100), KH	EDDY.156
97	CONTINUE	EDDY.157
	PI = 3.14159265	EDDY.158
	B1B = .5*(GNUTB-GNUTA)	EDDY.159
	GO TO (101,102,103), MCASE	EDDY.160
102	CONTINUE	EDDY.161
	YGNA = Y(J)	EDDY.162
	YDNM = Y(JSP) - YGNA	EDDY.163
	GO TO 101	EDDY.164
103	CONTINUE	EDDY.165
	YGNA = Y(J)	EDDY.166
	YDNM = Y(JMN) - YGNA	EDDY.167
101	CONTINUE	EDDY.168
	IF (GNUTA-GNT1) 100,200,200	EDDY.169
100	CONTINUE	EDDY.170
	GO TO (504,500,502), MCASE	EDDY.171
500	CONTINUE	EDDY.172
	THHTA = -PI*(Y(JSP)-Y(J))/YDNM	EDDY.173
	GO TO 504	EDDY.174
502	CONTINUE	EDDY.175
	THHTA = -PI*(Y(JMN)-Y(J))/YDNM	EDDY.176
504	CONTINUE	EDDY.177
	GO TO (120,112,111), MCASE	EDDY.178
110	CONTINUE	EDDY.179
	IF (Y(J)-Y(JSP)) 120,120,111	EDDY.180
111	IF (Y(J)-Y(JMN)) 130,130,140	EDDY.181
112	IF (Y(J)-Y(JSP)) 131,140,140	EDDY.182
120	GNUT(J,I) = GNUTA	EDDY.183
	GO TO 150	EDDY.184
C 130	GNT(J,I) = GNUTA + (GNUTB-GNUTA)*(Y(J)-.50*Y(JSP))/(.75*Y(JSP))	EDDY.185
131	GNUT(J,I) = GNUTA + (GNUTB-GNUTA)*(Y(J)-YGNA)/YDNM	EDDY.186
	GO TO 150	EDDY.187
130	GNUT(J,I) = (GNUTA + B1B) + B1B*COS(THHTA)	EDDY.188
	GO TO 150	EDDY.189
140	GNUT(J,I) = GNUTB * GAMMA2	EDDY.190
150	CONTINUE	EDDY.191
	KH = 2	EDDY.192
	GO TO 300	EDDY.193
200	GNUT(J,I) = GNT1	EDDY.194
300	CONTINUE	EDDY.195
	IF (KCODE.LE.0) GO TO 620	EDDY.196
	GO TO (605,613), KCORE	EDDY.197
605	CONTINUE	EDDY.198
	IF (X(3).GE.T*IP) GO TO 606	EDDY.199
	GO TO 607	EDDY.200
606	CONTINUE	EDDY.201
	KCORE = 2	EDDY.202
	GO TO 613	EDDY.203
607	CONTINUE	EDDY.204
	GO TO (610,610,600), MCASE	EDDY.205
600	CONTINUE	EDDY.206
	XLAST = X(3)	EDDY.207
	DO 601 J=2,JSP	EDDY.208

	GNUT(J,I) = 0.	EDDY.209
601	CONTINUE	EDDY.210
613	CONTINUE	EDDY.211
	JMM = JSP+1	EDDY.212
	DO 603 J = JMM,JMN	EDDY.213
	IF(U(J,I).LE.UMX*.95) GO TO 604	EDDY.214
603	CONTINUE	EDDY.215
604	CONTINUE	EDDY.216
	JDY = J	EDDY.217
	IF(JDY.LE.(JSP+2))KFLAT = 2	EDDY.218
	IF(KFLAT.GE.2) GO TO 610	EDDY.219
C	IF(JDY.EQ.JMN) GO TO 610	EDDY.220
	IF(KCORE.LE.1) GO TO 617	EDDY.221
	FAD = .5*GNUTA	EDDY.222
	KSP = JSP-4	EDDY.223
	DO 615 J = KSP,JSP	EDDY.224
	THH1 = PI*(Y(JSP)-Y(J))/(Y(JSP)-Y(KSP))	EDDY.225
	GNUT(J,I) = FAD - FAD*COS(THH1)	EDDY.226
615	CONTINUE	EDDY.227
617	CONTINUE	EDDY.228
	JDY1 = JDY-1	EDDY.229
	DO 614 J = JMM,JDY1	EDDY.230
	GNUT(J,I) = 0.	EDDY.231
614	CONTINUE	EDDY.232
	JMN2 = JDY + 4	EDDY.233
	DAD = .5*GNUT(JMN2,I)	EDDY.234
	DO 616 J = JDY,JMN2	EDDY.235
	THH2 = (-PI*(Y(JMN2)-Y(J)))/(Y(JMN2)-Y(JDY))	EDDY.236
	GNUT(J,I) = DAD + DAD*COS(THH2)	EDDY.237
616	CONTINUE	EDDY.238
	IF(KCORE.EQ.2) GO TO 610	EDDY.239
	GO TO 620	EDDY.240
610	CONTINUE	EDDY.241
	IF(X(3).LT.TRIP) GO TO 620	EDDY.242
	GO TO (620,620,611),MCASE	EDDY.243
611	CONTINUE	EDDY.244
	XFAST = XLAST + .1	EDDY.245
	IF(X(3).GE.XFAST) GO TO 621	EDDY.246
	SAD = -5.*PI*(XFAST-X(3))	EDDY.247
	DO 612 J = 2,JSP	EDDY.248
	GAD = .5*GNUT(J,I)	EDDY.249
	GNUT(J,I) = GAD + GAD*COS(SAD)	EDDY.250
612	CONTINUE	EDDY.251
	GO TO 620	EDDY.252
621	CONTINUE	EDDY.253
	IF(KFLAT.GE.2) KCODE = 0	EDDY.254
620	CONTINUE	EDDY.255
	RETURN	EDDY.256
400	STOP	EDDY.257
	END	EDDY.258

	SUBROUTINE EXTRAP(ITR,JMX,U,X,LPR,UP,U8)	EXTRAP.2
C	ROUTINE TO LINEARIZE THE MOMENTUM EQUATION	EXTRAP.3
	COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),OY(25),EXTRAP.4	
	1 XX(25),YPL(100),YO(100),CF(200),YDD(100),D(100,3),UT(100),V(100),EXTRAP.5	
	2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),EXTRAP.6	
	3DMP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),EXTRAP.7	
	4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),EXTRAP.8	
	5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),EXTRAP.9	
	6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)EXTRAP.10	
	7,A4(100),DUMMY(452)	EXTRAP.11
	DIMENSION X(3),U(100,3),UP(100),U8(3)	EXTRAP.12
	COMMON/ DUBX / DUBX	EXTRAP.13
	COMMON/W8/W8(3)	EXTRAP.14
	JMX1 = JMX-1	EXTRAP.15
	JMM = JMX + 3	EXTRAP.16
	JMM1 = JMM - 1	EXTRAP.17
	JMX2 = JMX + 1	EXTRAP.18

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UP(JMX) = U8(3)
WP(JMX) = W8(3)
DO 40 J = JMX2, JMM1
UP(J) = U(J,3)
WP(J) = W(J,3)
40 CONTINUE
DO 50 J = JMM, 100
UP(J) = U8(3)
WP(J) = W8(3)
50 CONTINUE
IF(ITR-1) 200, 200, 100
100 DO 150 J=1, JMX1
UP(J) = .75*U(J,3) + .25*UP(J)
WP(J) = .75*W(J,3) + .25*WP(J)
150 CONTINUE
RETURN
200 GO TO (210, 300), LPR
210 DO 220 J=1, JMX1
UP(J) = U(J,2) + (DU8X/12.)* (X(3)-X(2))
WP(J) = W(J,2)
220 CONTINUE
UP(1) = 0.
WP(1) = 0.
RETURN
300 DX1 = X(3)-X(2)
DX2 = X(2)-X(1)
DO 350 J=1, JMX1
DU = U(J,2)-U(J,1)
DW = W(J,2) - W(J,1)
UP(J) = U(J,2) + DU*DX1/DX2
WP(J) = W(J,2) + DW*DX1/DX2
350 CONTINUE
RETURN
END

```

EXTRAP.19
EXTRAP.20
EXTRAP.21
EXTRAP.22
EXTRAP.23
EXTRAP.24
EXTRAP.25
EXTRAP.26
EXTRAP.27
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EXTRAP.38
EXTRAP.39
EXTRAP.40
EXTRAP.41
EXTRAP.42
EXTRAP.43
EXTRAP.44
EXTRAP.45
EXTRAP.46
EXTRAP.47
EXTRAP.48
EXTRAP.49
EXTRAP.50
EXTRAP.51
EXTRAP.52

FUNCTION FF(A)

```

EQUIVALENCE (KA, AA)
AA = A
FF = FLOAT(KA)
RETURN
END

```

FF.2
FF.3
FF.4
FF.5
FF.6
FF.7
FF.8

SUBROUTINE HTABLE(H, DEL, NDEG)

```

DIMENSION UDUNT(41), SIGBT(41), YBET(41)
DIMENSION HT(78), YBARDT(78), YBAREC(78), YDT(78), SIGDT(78)
DIMENSION SIGRE(78)

```

```

DATA (HT(I), I=1, 78) / 1.26, 1.28, 1.30, 1.32, 1.34, 1.36, 1.38, 1.40,
1 1.42, 1.44, 1.46, 1.48, 1.50, 1.52, 1.54, 1.56, 1.58,
2 1.60, 1.62, 1.64, 1.66, 1.68, 1.70, 1.72, 1.74, 1.76,
3 1.78, 1.80, 1.82, 1.84, 1.86, 1.88, 1.90, 1.92, 1.94,
4 1.96, 1.98, 2.00, 2.02, 2.04, 2.06, 2.08, 2.10, 2.12,
5 2.14, 2.16, 2.18, 2.20, 2.22, 2.24, 2.26, 2.28, 2.30,
6 2.32, 2.34, 2.36, 2.38, 2.40, 2.42, 2.44, 2.46, 2.48,
7 2.50, 2.52, 2.54, 2.56, 2.58, 2.60, 2.62, 2.64, 2.66,
8 2.68, 2.70, 2.72, 2.74, 2.76, 2.78, 2.80 /
DATA(YBARDT(I), I=1, 78) / 11.8, 10.15, 9.8, 2.7, 4.6, 82, 6.36, 6.,
1 5.7, 5.43, 5.23, 5.04, 4.86, 4.71, 4.59, 4.49, 4.38,
2 4.3, 4.2, 4.13, 4.05, 3.99, 3.91, 3.85, 3.8, 3.74,
3 3.69, 3.64, 3.59, 3.53, 3.49, 3.46, 3.41, 3.38, 3.33,
4 3.29, 3.26, 3.22, 3.2, 3.18, 3.16, 3.13, 3.1, 3.09,
5 3.07, 3.05, 3.03, 3.01, 3., 2.99, 2.97, 2.95, 2.93,
6 2.92, 2.91, 2.9, 2.89, 2.88 /
DATA(YBAREC(I), I=1, 78) / 8.5, 7.85, 7.3, 6.75, 6.3, 5.87, 5.5,
1 5.21, 5., 4.75, 4.52, 4.37, 4.2, 4.07, 3.95, 3.82,
2 3.74, 3.64, 3.57, 3.5, 3.44, 3.37, 3.31, 3.29, 3.23,
3 3.19, 3.14, 3.1, 3.04, 3., 2.95, 2.9, 2.88, 2.84,

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HTABLE.2
HTABLE.3
HTABLE.4
HTABLE.5
HTABLE.6
HTABLE.7
HTABLE.8
HTABLE.9
HTABLE.10
HTABLE.11
HTABLE.12
HTABLE.13
HTABLE.14
HTABLE.15
HTABLE.16
HTABLE.17
HTABLE.18
HTABLE.19
HTABLE.20
HTABLE.21
HTABLE.22
HTABLE.23
HTABLE.24
HTABLE.25

4	2.81,2.79,2.75,2.71,2.69,2.66,2.63,2.61,2.59,	HTABLE.26
5	2.58,2.56,2.54,2.52,2.5, 2.48,2.46,2.44,2.42,	HTABLE.27
6	2.41,2.4, 2.39,2.38,2.37,2.36,2.35,19*2.34/	HTABLE.28
	DATA(YDT(I), I=1,78)/1.2, 1.2, 1.2, 1.2, 1.2, 1.2, 1.2, 1.1, 1.01,	HTABLE.29
1	.915,.83, .758,.696,.645,.588,.544,.503,.47, .435,	HTABLE.30
2	.402,.372,.345,.32, .296,.277,.261,.246,.235,.222,	HTABLE.31
3	.214,.205,.199,.191,.186,.182,.179,.174,.171,.169,	HTABLE.32
4	.165,.162,.16, .159,.158,.157,.156,.155,.154,31*.153/	HTABLE.33
	DATA(SIGDT(I), I=1,78)/2.8, 2.34,1.94,1.62,1.41,1.25,1.14,1.05,	HTABLE.34
1	.99, .93, .885,.84, .805,.775,.75, .725,.705,.68,	HTABLE.35
2	.66, .645,.63, .615,.6, .59, .575,.565,.555,.545,	HTABLE.36
3	.535,.53, .525,.518,.512,.505,.5, .495,.49,.486,	HTABLE.37
4	.48, .478,.475,.47, .465,.46, .458,.455,.45, .443,	HTABLE.38
5	.44, .437,.432,.428,.425,.422,.421,.419,.418,.417,	HTABLE.39
6	.415,.412,.408,17*.405/	HTABLE.40
	DATA(SIGRE(I), I=1,78)/2.8, 2.54,2.3, 2.11,1.93,1.78,1.65,1.53,	HTABLE.41
1	1.43,1.34,1.27,1.21,1.15,1.1, 1.06,1.02,.98, .95,	HTABLE.42
2	.92, .89, .86, .84, .81, .79, .768,.748,.725,.705,	HTABLE.43
3	.69, .675,.658,.645,.63, .62, .605,.595,.585,.575,	HTABLE.44
4	.567,.56, .553,.548,.54, .537,.53, .522,.518,.515,	HTABLE.45
5	.508,.505,.5, .498,.495,.492,.49, .488,.482,.48,	HTABLE.46
6	.478,.476,.474,.472,16*.47/	HTABLE.47
	DATA (UDUNT(I), I=1,41)/.0,.1,.2,.3,.4,.5,.6,.7,.8,.9,1.0,1.1,	HTABLE.48
1	1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,2.0,2.1,2.2,	HTABLE.49
2	2.3,2.4,2.5,2.6,2.7,2.8,2.9,3.0,3.1,3.2,	HTABLE.50
3	3.3,3.4,3.5,3.6,3.7,3.8,3.9,4.0/	HTABLE.51
	DATA (SIGBT(I), I=1,41)/.0224,.01875,.0175,.0158,.01445,.0136,	HTABLE.52
1	.0131,.0128,.01255,.0123,.012,.01175,	HTABLE.53
2	.01145,.0112,.0109,.0106,.01038,.01,.00975,	HTABLE.54
3	.0095,.0092,.0089,.00865,.00835,.00807,	HTABLE.55
4	.0078,.0075,.00725,.0069,.0066,.0064,.00607,	HTABLE.56
5	.0058,.0055,.0052,.0049,.0046,.00416,.0041,	HTABLE.57
6	.00378,.00353/	HTABLE.58
	DATA (YBRT(I), I=1,41)/.1325,.115,.1015,.0915,.084,.0775,.0719,	HTABLE.59
1	.0676,.064,.0606,.0578,.0555,.0531,.0513,	HTABLE.60
2	.0495,.048,.0466,.0453,.044,.043,.0416,.0406,	HTABLE.61
3	.0399,.0389,.0382,.0375,.0367,.036,.0355,	HTABLE.62
4	.0349,.0343,.0337,.0331,.0327,.0321,.0318,	HTABLE.63
5	.0313,.031, .0309,.0304,.03/	HTABLE.64
	ENTRY UDUNYB	HTABLE.65
	DEL = TBLU1(H,UDUNT,YBRT,NDEG,41)	HTABLE.66
	RETURN	HTABLE.67
	ENTRY UDUNSG	HTABLE.68
	DEL = TBLU1(H,UDUNT,SIGBT,NDEG,41)	HTABLE.69
	RETURN	HTABLE.70
	ENTRY HTSIG	HTABLE.71
	DEL = TBLU1(H,HT,SIGDT,NDEG,78)	HTABLE.72
	RETURN	HTABLE.73
	ENTRY HTYBAR	HTABLE.74
	DEL = TBLU1(H,HT,YBARDT,NDEG,78)	HTABLE.75
	RETURN	HTABLE.76
	ENTRY HTYDEL	HTABLE.77
	DEL = TBLU1(H,HT,YDT,NDEG,78)	HTABLE.78
	RETURN	HTABLE.79
	ENTRY HTSIR	HTABLE.80
	DEL = TBLU1(H,HT,SIGRE,NDEG,78)	HTABLE.81
	RETURN	HTABLE.82
	ENTRY HTYBRE	HTABLE.83
	DEL = TBLU1(H,HT,YBAREC,NDEG,78)	HTABLE.84
	RETURN	HTABLE.85
	END	HTABLE.86

SUBROUTINE ITSM(X,XC,IX,KX,NX)	ITSM.2
DIMENSION XC(1),IX(1)	ITSM.3
B=1.E30	ITSM.4
DO 2 I=1,NX	ITSM.5
A=ABS(XC(I)-X)	ITSM.6
IF (B-A)2,1,1	ITSM.7

1	B=A	ITSM.8
	N=1	ITSM.9
2	CONTINUE	ITSM.10
	L=N-1	ITSM.11
	IX(1)=N	ITSM.12
	N=N+1	ITSM.13
	DO 7 I=1,KX	ITSM.14
	IF (L)6,6,3	ITSM.15
3	IF (N-NX)4,4,5	ITSM.16
4	A=ABS(XC(L)-X)	ITSM.17
	B=ABS(XC(N)-X)	ITSM.18
	IF (A-B)5,5,6	ITSM.19
5	IX(I+1)=L	ITSM.20
	L=L-1	ITSM.21
	GO TO 7	ITSM.22
6	IX(I+1)=N	ITSM.23
	N=N+1	ITSM.24
7	CONTINUE	ITSM.25
	RETURN	ITSM.26
	END	ITSM.27

	FUNCTION LSVFN(X,XSTART,LHV,H,HSV,THETA,TH2,CF2,CF3)	LSVFN.2
C	FUNCTION TO GET LPR, HSV, ETC.	LSVFN.3
	DIMENSION X(3),CF2(3)	LSVFN.4
	IF(X(3)-XSTART) 61,61,63	LSVFN.5
61	LPR = 1	LSVFN.6
	GO TO 64	LSVFN.7
63	LPR = 2	LSVFN.8
64	CONTINUE	LSVFN.9
	GO TO (71,74), LHV	LSVFN.10
71	HSV = H	LSVFN.11
	TH2 = THETA	LSVFN.12
	CF3 = CF2(3)	LSVFN.13
	LHV = 2	LSVFN.14
74	CONTINUE	LSVFN.15
	LSVFN = LPR	LSVFN.16
	RETURN	LSVFN.17
	END	LSVFN.18

	SUBROUTINE MATRIX(B,G,JMX,II,JJ)	MATRIX.2
	DIMENSION B(1), G(1)	MATRIX.3
	JMX1 = JMX-1	MATRIX.4
	JMX2 = JMX-2	MATRIX.5
	JP = JJ	MATRIX.6
	KK = II+JJ+1	MATRIX.7
	DO 400 I=1,JMX1	MATRIX.8
100	LL = KK*(I-1)+1	MATRIX.9
	IF(I-(JMX-JJ)) 115,110,110	MATRIX.10
110	JP = JMX1 - I	MATRIX.11
115	W = 1./B(LL)	MATRIX.12
	IF(JP) 200,200,120	MATRIX.13
120	DO 150 L=1,JP	MATRIX.14
150	B(LL+L) = W*B(LL+L)	MATRIX.15
200	G(I) = W*G(I)	MATRIX.16
	IQ = II	MATRIX.17
	IF(I-(JMX-II)) 220,210,210	MATRIX.18
210	IQ = (JMX1) - I	MATRIX.19
220	IF(IQ) 400,400,300	MATRIX.20
300	DO 380 L=1,IQ	MATRIX.21
	N = (KK-1)*L + LL	MATRIX.22
	DO 360 LS=1,JP	MATRIX.23
360	B(N+LS) = B(N+LS)-B(N)*B(LL+LS)	MATRIX.24
380	G(L+I) = G(L+I) - B(N)*G(I)	MATRIX.25
400	CONTINUE	MATRIX.26
	L = KK*JMX2+1	MATRIX.27
500	DO 600 M=1,JMX2	MATRIX.28
	I = JMX2-(M-1)	MATRIX.29
	L = L-KK	MATRIX.30

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JP = JJ
IF (1-(JMX-JJ)) 520,510,510
510 JP = JMX1-I
520 IF (JP) 550,550,530
530 DO 540 LS=1,JP
540 G(I) = G(I)-R(L+LS)*G(I+LS)
550 CONTINUE
600 CONTINUE
RETURN
END

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MATRIX.31
MATRIX.32
MATRIX.33
MATRIX.34
MATRIX.35
MATRIX.36
MATRIX.37
MATRIX.38
MATRIX.39
MATRIX.40

```

SUBROUTINE OPTION(LN,LST2,DX2,DX1,DXMAX,ITR,X,LOPT,KRP2,LDX)
DIMENSION X(3)
GO TO (250,90,300,400), LN
90 LOPT = 1
RETURN
250 CONTINUE
GO TO (90,251), LST2
251 CONTINUE
DX2 = DX1*2.
IF (DX2 - DXMAX) 260,260,255
255 DX1 = DXMAX
DX2 = DX1
260 CONTINUE
GO TO 90
300 CONTINUE
KRP2 = 1
303 GO TO (310,320), KRP2
310 CONTINUE
C 310 CALL PRINT(5)
320 ITR = ITR+1
LOPT = 2
RETURN
400 CONTINUE
ITR = 1
GO TO (420,410), LST2
410 CONTINUE
LDX = LDX*1
X(3) = X(3)-DX1/2.
DX1 = .5*DX1
DX2 = DX1
420 CONTINUE
IF (LDX-16) 800,900,900
800 LOPT = 2
RETURN
900 LOPT = 3
RETURN
END

```

OPTION.2
OPTION.3
OPTION.4
OPTION.5
OPTION.6
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OPTION.36
OPTION.37
OPTION.38

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SUBROUTINE PFIELD(L,X,P,Y,XTB)
C ROUTINE TO CALCULATE THE EXTERNAL PRESSURE FIELD
COMMON/ SCRA / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),PFIELD.4
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),PFIELD.5
2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100), PFIELD.6
3 UP(100),W(100,3),B(400),BY(400),YYDEL(100),GNUT(100,3),DU(200), PFIELD.7
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200), PFIELD.8
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), PFIELD.9
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)PFIELD.10
7,A4(100),DUMMY(452) PFIELD.11
DIMENSION P(3),Y(100),XTB(30) PFIELD.12
COMMON/PLUB/ NCPX,NCPY,KCP, YDEL PFIELD.13
COMMON/SZ1/JMX PFIELD.14
COMMON/ SZ3/DUDM(3),U8(3) PFIELD.15
COMMON/JAG/LST2 PFIELD.16
COMMON/STAT/PHREF,UREF PFIELD.17
COMMON/GRID/YCP(20),CP(20,30),YGAP PFIELD.18
COMMON/STP/KSTP PFIELD.19
COMMON/UVEL/UEND PFIELD.20

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    JMX1 = JMX - 1
    GO TO (30,40),KSTP
30 CONTINUE
    DO 20 J = 1,JMX1
    PS(J,3) = -TALU2(Y(J),X,YCP,XTB,PPC,1,1,NCPY,NCPX,20,30)
20 CONTINUE
40 CONTINUE
    P(3) = TBLU2(Y(JMX),X,YCP,XTB,PPC,1,1,NCPY,NCPX,20,30)
    JMM = JMX * 4
    JML = JMX-6
    GO TO (60,50),KSTP
50 CONTINUE
    DO 10 J = 1,JMM
    UEDGE(J) = TALU2(Y(J),X,YCP,XTB,UUC,1,1,NCPY,NCPX,20,30)
10 CONTINUE
    UEND = UEDGE(JMX1)
    U8(3) = UEDGE(JMX)
    U(JMX+1,3) = UEDGE(JMX+1)
    U(JMX+2,3) = UEDGE(JMX+2)
60 CONTINUE
    GO TO (200,300), L
200 CONTINUE
    P(2) = P(3)
    P(1) = P(3)
    U8(2) = U8(3)
    U8(1) = U8(3)
300 RETURN
    END

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PFIELD.21
PFIELD.22
PFIELD.23
PFIELD.24
PFIELD.25
PFIELD.26
PFIELD.27
PFIELD.28
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PFIELD.45
PFIELD.46
PFIELD.47
PFIELD.48

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SUBROUTINE POUT(NPRF,X,XX,KRTNN,LST2,ITRR,LN,ITR)
DIMENSION X(3)
COMMON/PNTOP/KKZ
COMMON/XFND/XFIND(20),NXFIND
DATA KXFIND/1/
IF(KXFIND.GT,NXFIND)GO TO 200
IF(X(3).LT,XFIND(KXFIND))GO TO 200
CALL PRINT(2)
KXFIND=KXFIND+1
200 CONTINUE
C IF(ABS(X(3)-XX(KP))-1.E-06) 102,102,101
IF(NPRF.EQ.1) GO TO 103
101 KNPRT = MOD(NPRF,KKZ)
IF(KNPRT.EQ.0) GO TO 103
GO TO 105
C 102 KP = KP+1
103 CALL PRINT(2)
105 IF(X(3)-XX) 108,106,106
106 CALL PRINT(2)
KRTNN = 1
RETURN
108 CONTINUE
KRTNN = 2
GO TO (95,97), LST2
95 ITRR=ITRR+1
CALL TEST(LN,ITR,2,LST2)
97 GO TO (80,98), LST2
80 CALL SORT(2)
C PERFORM SORT, BUT NOT FOR X.
C PRINTOUT THE NEW V.
CALL PRINT(2)
GO TO 84
C PERFORM USUAL SORT.
98 CALL SORT(1)
84 CONTINUE
RETURN
END

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POUT.2
POUT.3
POUT.4
POUT.5
POUT.6
POUT.7
POUT.8
POUT.9
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POUT.38

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SUBROUTINE PRINT(L)
C ROUTINE TO PRINT BOUNDARY LAYER OUTPUT
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),PRINT.2
PRINT.3
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),PRINT.4
2 GAMI(100),GAMF(100),D(200),US(100),YY(100),DM(100),UUR(100),PRINT.5
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),PRINT.6
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUNCE(200),PRINT.7
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),PRINT.8
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)PRINT.10
7,A4(100),UR(100,3),DUMMY(152)PRINT.11
COMMON /TITLE/ TITLE(8)PRINT.12
DIMENSION X(3),U8(3),P(3),CF2(3)PRINT.13
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8INPRINT.14
COMMON/SZ3/X,U8PRINT.15
COMMON/ SZ4 / UTAU,UD,DELS,THETA,H,DELTA,CF2,XXM,GNUPRINT.16
COMMON/ PRESSUR / PPRINT.17
COMMON/SZ9/ITRPRINT.18
COMMON/SZ14/NPRFPRINT.19
COMMON/SZ21/ITRRPRINT.20
COMMON/VPRF/WVPRPRINT.21
COMMON/SZTBL/XSW,HSVPRINT.22
COMMON/XMON/TH2,CF3PRINT.23
COMMON/XMPR/UTEST,UTJ,UTSS,UTRRPRINT.24
COMMON/CL/CL,CDT,CDF,CDP,DUM(2),CMPRINT.25
COMMON/ CURV1 / R(3)PRINT.26
COMMON/STAT/PHREF,UREFPRINT.27
COMMON/SANGLE/SANGLEPRINT.28
COMMON/PHIL/IPHILPRINT.29
COMMON/ITR/ITR999,ITRM99PRINT.30
COMMON/PARAM/MACH,ALPHA,REFA,MATIN,REFC,UIIN,REFX,REFZ,CREFPRINT.31
DIMENSION YNORM(100),UNORM(100),WNORM(100)PRINT.32
IF(ITR999.LT,IPHIL)GO TO (75,6001,75,75,6002,75,75,75,75,75),LPRINT.33
GO TO (100,200,300,400,500,600,700,800,900,1000), LPRINT.34
100 WRITE(6,1)PRINT.35
RETURNPRINT.36
200 CONTINUEPRINT.37
WRITE(6,22)PRINT.38
C NORMAL PRINTOUTPRINT.39
WRITE(6,20) (TITLE(I), I=1,8)PRINT.40
WRITE(6,26) X(3),X(3),DX,UTAU,DELTA,CF2(1),DELS,CF2(2),THETA,PRINT.41
1 CF2(3),H,ITR,UC,NPRF,U8(3),R(3)PRINT.42
WRITE(6,7) X(2),X(3),X(3)PRINT.43
DO 6666 J=1,JMXPRINT.44
YNORM(J)=Y(J)/REFCPRINT.45
UNORM(J)=U(J,3)/U(JMX,3)PRINT.46
WNORM(J) = 0.0PRINT.47
IF(W(JMX,3).EQ.0.0)GO TO 6666PRINT.48
WNORM(J)=W(J,3)/w(JMX,3)PRINT.49
6666 CONTINUEPRINT.50
WRITE(6,9) (YNORM(J),WNORM(J),UNORM(J),UP(J),DUDY(J,3),PRINT.51
V(J),GNUT(J,3),PRINT.52
1 PS(J,3),UEDGE(J), J=1,JMX)PRINT.53
6001 IF (SANGLE .EQ. 0.) GO TO 55PRINT.54
CALL RESULT(CF2,JMX,X,2)PRINT.55
55 CONTINUEPRINT.56
RETURNPRINT.57
300 CONTINUEPRINT.58
WRITE(6,22)PRINT.59
C PRINT ITERATION NUMBERPRINT.60
WRITE(6,5) ITRPRINT.61
RETURNPRINT.62
C PRINT TERMINATION MESSAGE.PRINT.63
400 WRITE(6,12)PRINT.64
RETURNPRINT.65
500 CONTINUEPRINT.66
WRITE(6,22)PRINT.67
WRITE(6,15) X(3)PRINT.68
WRITE(6,14) X(3),DELTA,DELS,THETA,H,UD,UTAU,CF2(1),CF2(2),CF2(3),PRINT.69
ITR,NPRF,U8(3)PRINT.70

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6002 DO 520 J = 1,JMX
      UR(J,2) = UP(J)
520 UR(J,3) = U(J,3)
      ITRM1 = ITR-1
C PRINT LAST TWO ITERATIONS.
      WRITE(6,16) ITRM1,ITR
      WRITE(6,17) (Y(J), (UR(J,I), I=2,3), DUDY(J,3), V(J),GNUT(J,3),
1      PS(J,3), J=1,JMX)
      RETURN
600 CONTINUE
      WRITE(6,22)
C PRINT NO CONVERGENCE MESSAGE.
      WRITE(6,21) ITRR
      RETURN
700 CONTINUE
      WRITE(6,22)
C PRINT ARRAY OVERFLOW MESSAGE.
      WRITE(6,30) JMX
      WRITE(6,22)
      RETURN
800 CONTINUE
C PRINT SEPARATION MESSAGE.
      WRITE(6,35)
      WRITE(6,22)
      RETURN
900 CONTINUE
      WRITE(6,22)
      RETURN
1000 CONTINUE
      WRITE(6,22)
      WRITE(6,50) DELS,THETA,H
      WRITE(6,60)
      WRITE(6,61) CL,CCT
      WRITE(6,22)
75 RETURN
1 FORMAT(1H1,20X,*CALCULATED VELOCITY FIELD FOR FLAP UPPER SURFACE*) PRINT.106
5 FORMAT(1H ,20X,20H** NO CONVERGENCE IN,I4,16H ITERATIONS. **/) PRINT.107
7 FORMAT(1H ,14X,3HX =F12.8,3X,3HX =F12.8,3X,3HX =F12.8/1H ,2X,1HY,1PRINT.108
13X,1HW,17X,1HU,17X,2HUP,10X,5HOU/DY,7X,1HV,11X,4HEDDY,8X,6HP-GRAD,PRINT.109
1 8X,10HU-INVISCID) PRINT.110
9 FORMAT(1H ,F9.5,2X,E12.3,6X,E12.3,6X,6E12.3) PRINT.111
12 FORMAT(1H0//1H0,30X,16HCASE TERMINATED.) PRINT.112
14 FORMAT(1H ,72X,13HVALUES AT X =,F12.8/73X,7HDELTA =E12.3/73X,7HDELPRINT.113
1* =E12.3/73X,7HTHETA =E12.3/73X,7HH.... =E12.3/73X,7HUD... =E12.3PRINT.114
2/73X,7HUTAU =E12.3/73X,7HCF(1) =E12.3/ 73X,7HCF(2) =E12.3/73X,7HCPPRINT.115
3F(3) =E12.3/73X,7HITER =,I4/73X,7HPRF.NO=,I5/73X7HU =,E12.3) PRINT.116
15 FORMAT(1H ,30X,38HRESULTS FOR LAST TWO ITERATIONS AT X =,F12.8) PRINT.117
16 FORMAT(1H ,14X, 6HITER =I2,10X,6HITER =I2,18X,17HOTHER VALUES USEDPRINT.118
1/1H ,2X,1HY,13X,5HU/UFS,13X,5HU/UFS,13X,5HOU/DY,7X,1HV,11X,4HGNUT,PRINT.119
2 14X,2HPS,8X,7HSTAT-PR) PRINT.120
17 FORMAT(1H ,F8.6,3X,E12.3,6X,E12.3,6X,3E12.3,5X,E12.3) PRINT.121
20 FORMAT(1H ,20X,8A10,10X,A10,A2) PRINT.122
21 FORMAT(1H0, 25HNO PROFILE CONVERGENCE IN. I3,12H ITERATIONS.) PRINT.123
22 FORMAT(1H0/1H0,15X,100(1H*)///) PRINT.124
24 FORMAT(1H ,41X,28HRESULTS-LAST THREE PROFILES,) PRINT.125
26 FORMAT(8H AT X =,F12.8,54X,8H AT X =,F12.8/8H0DX =,E11.3,56X,PRINT.126
1 7HUTAU =,E11.3/8H DELTA =,E11.3,56X,7HCF2(1)=,E11.3/ PRINT.127
1 8H DELS =,E11.3,56X,7HCF2(2)=,E11.3/8H THETA =,E11.3,56X, PRINT.128
1 7HCF2(3)=,E11.3/8H H =,E11.3,56X,7HITER =,I3/8H UD PRINT.129
1=,E11.3,56X,7HPRF NO=,I4/8H U =,E11.3,56X,7HR(3) =,E11.3//) PRINT.130
30 FORMAT(1H0, 33HDIMENSION LIMITS EXCEEDED. JMX =,I4, PRINT.131
12X,16HCASE TERMINATED.) PRINT.132
35 FORMAT(20X,30HSEPARATION. - CASE TERMINATED.) PRINT.133
50 FORMAT(1H0,20X,*VALUES OF DISPLACEMENT THICKNESS, MOMENTUM THICKNEPRINT.134
1SS,*/21X,*AND SHAPE FACTOR FOR THE WHOLE BOUNDARY LAYER (LAST PROFFPRINT.135
2ILE),*//21X,*DELS =*,E10.3,4X,*THETA =*,E10.3,4X,*H =*,E10.3) PRINT.136
60 FORMAT(1H0,20X,*LIFT COEFFICIENT* 10X *PROFILE DRAG COEFFICIENT*/)PRINT.137
61 FORMAT(1H0,20X,*CL =*,E10.3,12X,*CD =*,E10.3) PRINT.138
END PRINT.139

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SUBROUTINE RFSULT(CF2,JMX,X,L)
C CALCULATION OF STREAMWISE AND CROSSFLOW VELOCITY
C PROFILES FOR PRINTOUT
COMMON/ SCRAT / ALFS(200),DBETA(200),Y(100),JY(25),JYT(25),DY(25),
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100),
7,A4(100),DUMMY(452)
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON /SANGLE/ SANGLE
COMMON /NPT/ NPT
COMMON/WB/WB(3)
COMMON/ SZ3 / DUM,U8
COMMON/PHIL/IPHIL
COMMON/ITR/ITR999,ITRM99
DIMENSION DUY(3),U8(3),X(3),CF2(3)
COMMON/CFR/CFR,CFS,CFC
COMMON/BLOUT/ HS,THTS,CFST
UR(1) = 0.
US(1) = 0.
WC(1) = 0.
DELS = 0.
THTS = 0.
I = 3
ALPAN = TBLU1(X(3),XPG,ALFS,1,NPT)
USMAX = SQRT(U8(3)**2 + WB(3)**2)
USMAX2 = USMAX**2
DO 10 J = 2,JMX
UR(J) = SQRT(U(J,I)**2 + W(J,I)**2)
BETA(J) = ACOS(U(J,I)/UR(J)) - ALPAN
US(J) = UR(J)*COS(BETA(J))
WC(J) = UR(J)*SIN(BETA(J))
DDY = Y(J) - Y(J-1)
UAV = .5*(US(J) + US(J-1))
UAV2 = UAV**2
DELS = DELS + (1.-UAV/USMAX)*DDY
THTS = THTS + UAV*DDY/USMAX - UAV2*DOY/USMAX2
10 CONTINUE
BETA(1) = 2.*BETA(2) - BETA(3)
HS = DELS/THTS
CBETA = BETA(1)
CFR = CF2(3)/COS(ALPAN + CBETA)
CFS = CFR*COS(CBETA)
CFST = CFS
CFC = CFR*SIN(CBETA)
CBETA = CBETA*57.29578
ALPAN = ALPAN*57.29578
IF(ITR999.LT.IPHIL) GO TO 100
GO TO(100,200),L
200 CONTINUE
WRITE(6,6300)
6300 FORMAT(1H0,5X,1HJ,10X,2HMUR,12X,4HBETA,15X,2HUS,13X,2HWC)
WRITE(6,6000)(J,UR(J),BETA(J), US(J),WC(J),J=1,JMX)
6000 FORMAT(15,5X,E12.4,5X,E12.4,5X,E12.4,5X,E12.4)
WRITE(6,6200)
WRITE(6,6100) X(3),CBETA,CF2(3),CFR,CFS,CFC,WB(3),ALPAN
6200 FORMAT(1H0,5X,1HX,10X,5HCBETA,10X,6HCF2(3),12X,3HCFR,12X,3HCFS,
1 12X,3HCFC,15X,5HWB(3),15X,5HALPAN)
6100 FORMAT(1H0,F8.4,5X,F8.4,6(5X,E12.4))
WRITE(6,6400)
6400 FORMAT(1H0,5X,1HH,7X,10HDELTA-STAR,5X,5HTHETA)
WRITE(6,6500) HS,DELS,THTS
6500 FORMAT(1H0,F8.4,2(5X,E12.4))
100 CONTINUE
RETURN
END

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RESULT.2
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SUBROUTINE SETUP2(LPR,KP,LST1,LST2,ITRR,DX1,DX2,DX,JMX1,JMX,	SETUP2.2
IX,XSTART,NPRF,U8,U8IN,P,DU)	SETUP2.3
DIMENSION X(1),U8(1),P(1),DU(200)	SETUP2.4
COMMON/ DUBX / DU8X	SETUP2.5
COMMON /NPT/ NPT	SETUP2.6
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)	SETUP2.7
LPR = 1	SETUP2.8
KP = 1	SETUP2.9
LST1 = 1	SETUP2.10
LST2 = 1	SETUP2.11
ITRR = 0	SETUP2.12
DX1 = DX	SETUP2.13
DX2 = DX	SETUP2.14
JMX1=JMX-1	SETUP2.15
X(3) = XSTART	SETUP2.16
X(2) = X(3)-DX	SETUP2.17
X(1) = X(2)-DX	SETUP2.18
XSTART = X(2)	SETUP2.19
XSTART = X(3)	SETUP2.20
NPRF = 1	SETUP2.21
U8(1) = U8FNT(X(1),U8IN)	SETUP2.22
U8(2) = U8FNT(X(2),U8IN)	SETUP2.23
U8(3) = U8FNT(X(3),U8IN)	SETUP2.24
P(1) = 0.	SETUP2.25
P(2) = 0.	SETUP2.26
P(3) = U8(3)*12.*U8IN*TBLU1(X(3),XIN,DU,1,NPT)	SETUP2.27
RETURN	SETUP2.28
END	SETUP2.29

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FUNCTION SHAPE(DELS,THETA,P,Y,U,U8,JMX,X,YYDEL,KALL)	SHAPE.2
C ROUTINE TO CALCULATE THE INTEGRAL BOUNDARY LAYER PARAMETERS	SHAPE.3
COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),	SHAPE.4
1 XX(25),YPL(100),YD(100),CF(200),YOD(100),T(100,3),UT(100),V(100),	SHAPE.5
2 GAMI(100),GAMF(100),Z(200),US(100),YY(100),UR(100),UUR(100),	SHAPE.6
3 UP(100),W(100,3),R(400),RW(400),DUNCE(100),GNUT(100,3),DU(200),	SHAPE.7
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),DUMMM(200),	SHAPE.8
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	SHAPE.9
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	SHAPE.10
7,A4(100),DUMMY(452)	SHAPE.11
COMMON/ SZ4 / DUNNY(5),DELTA	SHAPE.12
DIMENSION P(1),Y(1),U(100,3),U8(1),X(1),YYDEL(100)	SHAPE.13
COMMON/ XSTART / XSTART	SHAPE.14
COMMON/SHAPE/JSP,CNNS,UMX	SHAPE.15
COMMON/ CURV1 / R(3)	SHAPE.16
CALCULATE UMAX, AND FIND JSP.	SHAPE.17
I = 3	SHAPE.18
IF(JSP.GT.JMX) JSP = JMX	SHAPE.19
DELS = 0.	SHAPE.20
THETA = 0.	SHAPE.21
IF(KALL.EQ.2) UMX = U8(3)	SHAPE.22
IF(KALL.EQ.2) JSP=JMX	SHAPE.23
IF((KVAL.EQ.2) .OR. (R(3).GT.(DELTA*1.E10))) GO TO 50	SHAPE.24
UPW = UMX*(1.+Y(JSP)/R(I))	SHAPE.25
C UPW = UEDGE(I)	SHAPE.26
GO TO 60	SHAPE.27
50 CONTINUE	SHAPE.28
UPW = UMX	SHAPE.29
60 CONTINUE	SHAPE.30
JLIM = JSP	SHAPE.31
IF(KALL.EQ.2) JLIM = JMX	SHAPE.32
DO 80 J=2,JLIM	SHAPE.33
PY = Y(J) + Y(J-1)	SHAPE.34
DDY = Y(J)-Y(J-1)	SHAPE.35
DUD = U(J,3) + U(J-1,3)	SHAPE.36
UAV = .5*DUD	SHAPE.37
UPS = UPW/(1. + PY/(2.*R(I)))	SHAPE.38
C UP = UEDGE(J)	SHAPE.39
Q = DDY*(UPS-UAV)/UPW	SHAPE.40

THETA = THETA * Q*UAV/UPW	SHAPE.41
DELS = DELS * 0	SHAPE.42
80 CONTINUE	SHAPE.43
H = DELS/THETA	SHAPE.44
DO 99 J=1,JMX	SHAPE.45
99 YYDEL(J) = Y(J)/DELS	SHAPE.46
SHAPE = H	SHAPE.47
RETURN	SHAPE.48
END	SHAPE.49
SUBROUTINE SORT(L)	
COMMON/ SCRA1 / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),OY(25),	
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),	
2 GAMI(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100),	
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200),	
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200),	
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100),	
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)	
7,A4(100),DUMMY(452)	
DIMENSION X(3),U8(3),P(3)	
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN	
COMMON/SZ3/X,U8	
COMMON/ PRESSUR / P	
COMMON/W8/W8(3)	
COMMON/PLUB/ NCPX,NCPY,KCP, YDEL	
COMMON/ CURV1 / R(3)	
GO TO (100,200), L	
100 CONTINUE	
DO 150 K = 1,2	
X(K) = X(K+1)	
P(K) = P(K+1)	
U8(K) = U8(K+1)	
R(K) = R(K+1)	
W8(K) = W8(K+1)	
150 CONTINUE	
200 CONTINUE	
DO 250 K = 1,2	
DO 260 J = 1,100	
U(J,K) = U(J,K+1)	
PS(J,K) = PS(J,K+1)	
W(J,K) = W(J,K+1)	
260 CONTINUE	
250 CONTINUE	
DO 270 J = 1,100	
GNUT(J,2) = GNUT(J,3)	
DUDY(J,2) = DUDY(J,3)	
270 CONTINUE	
RETURN	
END	
SUBROUTINE SPEED(LST2,ITRR,ITR,V,U,JMX,X,Y,LN)	
DIMENSION V(100),U(100,3),X(3),Y(100)	
COMMON/MARY/OXS	
COMMON/ XSTART / XSTART	
GO TO (8000,8002), LST2	
8000 IF (ITRR-2) 8002,8002,8001	
8001 CALL PRINT(6)	
LST2 = 2	
8002 CONTINUE	
IF (ITR-2) 130,120,120	
120 V(1) = 0.	
GO TO (8006,130), LST2	
8006 ITRR = ITRR+1	
CALL TEST(LN,ITR,2,LST2)	
GO TO (8008,130), LST2	
8008 CALL SORT(2)	
130 CONTINUE	
RETURN	
END	

	SUBROUTINE TEST(LN, ITR, L, LST2)	TEST.2
	COMMON/ SCRAT / ALFS(200), CBETA(200), Y(100), JY(25), JYT(25), NY(25), TEST.3	
1	XX(25), YPL(100), YD(100), CF(200), YDD(100), U(100,3), UT(100), V(100), TEST.4	
2	GAMI(100), GAMF(100), D(200), US(100), YY(100), UR(100), UUR(100), TEST.5	
3	UP(100), W(100,3), B(400), BW(400), YYDEL(100), GNUT(100,3), DU(200), TEST.6	
4	UTABLE(100), DUDY(100,3), PS(100,3), SP(100,3), OUNCE(200), TEST.7	
5	DXD(20,30), PPC(20,30), UUC(20,30), UEDGE(100), WP(100), XPG(100), TEST.8	
6	UPG(100), WC(100), BETA(100), RTAB(50), G(99), GW(99), A3(100), A31(100) TEST.9	
7	A4(100), DUMMY(452)	TEST.10
	COMMON/ SZ4 / UTAU, UD, DELS, THETA, H, DELTA, CF2, XMX, GNU	TEST.11
	DIMENSION X(3), U8(3), CF2(3), P(3)	TEST.12
	COMMON/ SZ1/ JMX, LMX, NP, UTS, ITRMX, WT, KWAL, DX, U8IN	TEST.13
	COMMON/ SZ3/ X, U8	TEST.14
	COMMON/ PRESSUR / P	TEST.15
	COMMON/ SZTBL/ XSW, HSV	TEST.16
	COMMON/ XMON/ TH2, CF3	TEST.17
	COMMON/ XMPR/ UTEST	TEST.18
	COMMON/ CURV1 / R(3)	TEST.19
	GO TO (90,1000), L	TEST.20
90	CONTINUE	TEST.21
	UTEST = ABS(U(NP,3) - UP(NP)) * 1.E+5 / U8(3)	TEST.22
	IF (UTEST - UTS > 20.) 100, 100, 300	TEST.23
100	CONTINUE	TEST.24
	IF (UTEST - UTS) 200, 200, 110	TEST.25
110	LN = 2	TEST.26
	RETURN	TEST.27
200	LN = 1	TEST.28
	RETURN	TEST.29
300	IF (ITR - ITRMX) 310, 400, 400	TEST.30
310	CONTINUE	TEST.31
	LN = 3	TEST.32
	RETURN	TEST.33
380	CONTINUE	TEST.34
400	CONTINUE	TEST.35
	LN = 4	TEST.36
	RETURN	TEST.37
1000	CONTINUE	TEST.38
	LST2 = 2	TEST.39
	RETURN	TEST.40
	END	TEST.41

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	FUNCTION TBLU2 (X, Y, XC, YC, ZC, KX, KY, NX, NY, MX, MY)	TBLU2.2
	DIMENSION XC(1), YC(1), ZC(MX, MY)	TBLU2.3
	DIMENSION IX(5), IY(5), ARG(5), VAL(5), YY(5)	TBLU2.4
	CALL ITSM (X, XC, IX, KX, NX)	TBLU2.5
	CALL ITSM (Y, YC, IY, KY, NY)	TBLU2.6
	M = KX + 1	TBLU2.7
	N = KY + 1	TBLU2.8
	EPS = 1.E-5	TBLU2.9
	DO 2 I = 1, M	TBLU2.10
	DO 1 J = 1, N	TBLU2.11
	K = IX(I)	TBLU2.12
	L = IY(J)	TBLU2.13
	ARG(J) = YC(L)	TBLU2.14
1	VAL(J) = ZC(K, L)	TBLU2.15
2	CALL ALI(Y, ARG, VAL, YY(I), N, EPS, IER)	TBLU2.16
	DO 3 I = 1, M	TBLU2.17
	J = IX(I)	TBLU2.18
3	ARG(I) = XC(J)	TBLU2.19
	CALL ALI(X, ARG, YY, A, M, EPS, IER)	TBLU2.20
	TBLU2 = A	TBLU2.21
	RETURN	TBLU2.22
	END	TBLU2.23

```

FUNCTION THICK(Y,U,U8,JMX)
C ROUTINE TO CALCULATE THE BOUNDARY LAYER THICKNESS
COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),THICK.2
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),T(100,3),UT(100),V(100),THICK.3
2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100), THICK.4
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200), THICK.5
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200), THICK.6
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), THICK.7
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100) THICK.8
7,A4(100),DUMMY(452) THICK.9
DIMENSION Y(1),U(100,3),U8(1) THICK.10
COMMON/SZ1/ JXX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN THICK.11
COMMON/ SZ3 / X(3) THICK.12
COMMON/SHAPE/ JSP,CNNS,UMX,UHIN,JMM,MCASE THICK.13
COMMON/ XSTART / XSTART THICK.14
COMMON/DELGFD/ DDELTA THICK.15
COMMON/ UVEL/ UEND THICK.16
C IF(X(3).EQ.XSTART) JMAXM = JMX THICK.17
IF(X(3).EQ.XSTART) JMAXM = JMX THICK.18
UFINAL = 0. THICK.19
K = -1 THICK.20
CANS = .001 THICK.21
JMM = JMX + 1 THICK.22
JML = JMX - 5 THICK.23
GO TO (6,5) KWAL THICK.24
C 5 CONTINUE THICK.25
C DO 7 J=JML,JMM THICK.26
C UEDGE(J) = U(JMX,3) THICK.27
C 7 CONTINUE THICK.28
C 6 CONTINUE THICK.29
C IF(X(3)-XSTART) 83,83,81 THICK.30
C 81 CONTINUE THICK.31
IF(MCASE.EQ.2) GO TO 11 THICK.32
JM2 = JMX + 2 THICK.33
DO 10 J=2,JM2 THICK.34
IF(U(J,3).GT.UEDGE(J)) U(J,3) = UEDGE(J) THICK.35
10 CONTINUE THICK.36
11 CONTINUE THICK.37
DO 1 J=JMM,JML,K THICK.38
IF(U(J,3).EQ.UEDGE(J)) GO TO 1 THICK.39
GO TO 2 THICK.40
1 CONTINUE THICK.41
2 CONTINUE THICK.42
ULAST = UFINAL THICK.43
UFINAL = ABS((UEDGE(J)-U(J,3))/UEDGE(J)) THICK.44
IF(UFINAL.GE.CANS) GO TO 3 THICK.45
J=J-1 THICK.46
GO TO 2 THICK.47
3 CONTINUE THICK.48
DELTA = Y(J+1) - ((CANS-ULAST)*(Y(J+1)-Y(J)))/(UFINAL-ULAST) THICK.49
JMX = J+1 THICK.50
IF(X(3).LE.XSTART) GO TO 84 THICK.51
DX = X(3)-X(2) THICK.52
DDELTA = (DELTA-DELOLD)/DX THICK.53
DELNEW = DELTA + DDELTA*DX THICK.54
DSTEP = Y(J) + .90*(Y(J+1)-Y(J)) THICK.55
IF(DELNEW.GT.DSTEP) JMX=JMX+1 THICK.56
IF(DELTA.GT.DSTEP) JMX = JMX + 1 THICK.57
DDELTA = .5*(DDELTA+DDELTA) THICK.58
GO TO 84 THICK.59
C 83 CONTINUE THICK.60
DELTA = Y(JMX-2) THICK.61
JMX = JMX-1 THICK.62
C 84 CONTINUE THICK.63
IF(JMX.LT.JMAXM) JMX = JMAXM THICK.64
IF(JMX.LT.JMAXM) JMX = JMAXM THICK.65
U8(3) = UEDGE(JMX) THICK.66
IF(JMX-99) 98,98,99 THICK.67
98 CONTINUE THICK.68
THICK.69
THICK.70

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ODOLO = ODELTA
DEOLOD = DELTA
THICK = DELTA
RETURN
99 CALL PRINT(7)
CALL PRINT(2)
CALL PRINT(7)
STOP
END

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THICK.71
THICK.72
THICK.73
THICK.74
THICK.75
THICK.76
THICK.77
THICK.78
THICK.79

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SUBROUTINE VELY(V,U,I,X,Y)
DIMENSION U(100,3), V(2), X(1), Y(1)
COMMON/ SCRAT / ALFS(200),CBETA(200),D(100),JY(25),JYT(25),DY(25),VELY,4
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),T(100,3),UT(100),Z(100),VELY,5
2 GAMI(100),GAMF(100),HD(200),US(100),YY(100),UR(100),UUR(100), VELY,6
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200), VELY,7
4 UTABLE(100),DUOY(100,3),PS(100,3),SP(100,3),DUNCE(200), VELY,8
5 DXQ(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), VELY,9
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)VELY,10
7,A4(100),DUMMY(452)
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN
COMMON/ SZ4 / UT,U,UD,DELS,THETA,H,DELTA,CF2,XX,GNU
COMMON/VPRF/WVPR
COMMON/ CURV1 / R(3)
WVPR = 6H VELY
V(1) = 0.
DO 100 J=2,JMX
DY = (Y(J)-Y(J-1))/12.
DUDX1 = DUX(U,I,J,X)
DUDX2 = DUX(U,I,J-1,X)
YAV = .5*(Y(J)+Y(J-1))
DELTAX = DELTA*1.E+10
IF( (KWAL.EQ.2) .OR. (R(I).GT.DELTAX) ) GO TO 60
H1M = R(I)/(R(I) + Y(J))
H2M = (R(I) + Y(J-1))/(R(I) + Y(J))
GO TO 70
60 H1M = 1.
H2M = 1.
70 CONTINUE
V(J) = V(J-1)*H2M - .5*H1M*DY*(DUDX1 + DUDX2)
100 CONTINUE
RETURN
END

```

```

VELY.2
VELY.3
VELY.4
VELY.5
VELY.6
VELY.7
VELY.8
VELY.9
VELY.10
VELY.11
VELY.12
VELY.13
VELY.14
VELY.15
VELY.16
VELY.17
VELY.18
VELY.19
VELY.20
VELY.21
VELY.22
VELY.23
VELY.24
VELY.25
VELY.26
VELY.27
VELY.28
VELY.29
VELY.30
VELY.31
VELY.32
VELY.33
VELY.34

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FUNCTION U8FNT(X,U8IN)
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON/ UIN/ UIN(100)
COMMON/ PARAM/ MACH,ALPHA,REFA,MATIN,REFC,UINF
DIMENSION XSU(30)
COMMON /NPT/ NPT
DO 10 I =1,NPT
XSU(I) = SU(I)*REFC
10 CONTINUE
U8 = TBLU1(X,XSU,UIN,1,NPT)
U8FNT = U8*U8IN
RETURN
END

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U8FNT.2
U8FNT.3
U8FNT.4
U8FNT.5
U8FNT.6
U8FNT.7
U8FNT.8
U8FNT.9
U8FNT.10
U8FNT.11
U8FNT.12
U8FNT.13
U8FNT.14

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SUBROUTINE VINPUT
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),DY(25),VINPUT.2
1 XX(25),YPL(100),YD(100),CF(200),YDD(100),U(100,3),UT(100),V(100),VINPUT.3
2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100), VINPUT.4
3 UP(100),W(100,3),B(400),BW(400),YYDEL(100),GNUT(100,3),DU(200), VINPUT.5
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200), VINPUT.6
5 DXD(20,30),PPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), VINPUT.7
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100)VINPUT.8
7,A4(100),DUMMY(452)
COMMON /NPT/ NPT
COMMON/ GEO / CFI,HI,RTN,UN,UTAU,RD,DELS,THETA,Z,C,KF,ITER,KL, VINPUT.10
1 KYG,KX,JOB
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100) VINPUT.11
DIMENSION X(3),U8(3),P(3) VINPUT.12
COMMON/W8/W8(3) VINPUT.13
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN VINPUT.14
COMMON/SZ3/X,U8 VINPUT.15
COMMON/ CURV1 / R(3) VINPUT.16
COMMON/PLUB/NCPX,NCPY,KCP,YDELP VINPUT.17
COMMON/ PRESSUR / P VINPUT.18
COMMON/SANGLE/SANGLE VINPUT.19
COMMON/XTB/XTB(30) VINPUT.20
GO TO (10,20) KCP VINPUT.21
10 CONTINUE VINPUT.22
XPZ = X(3) VINPUT.23
CALL PFIELD(1,XPZ,P,Y,XTB) VINPUT.24
USURF = U8(3) VINPUT.25
GO TO 30 VINPUT.26
20 CONTINUE VINPUT.27
USURF = U8FNT(X(3),U8IN) VINPUT.28
U8(3) = USURF VINPUT.29
GO TO (21,22),KWAL VINPUT.30
21 CONTINUE VINPUT.31
R(3) = TBLU1(X(3),XPG,RTAB,1,NPT) VINPUT.32
R(2) = TBLU1(X(2),XPG,RTAB,1,NPT) VINPUT.33
U8(3) = USURF/(1.+Y(JMX)/R(3)) VINPUT.34
22 CONTINUE VINPUT.35
JP2 = JMX + 3 VINPUT.36
JL6 = JMX - 6 VINPUT.37
DO 83 J = 1,JP2 VINPUT.38
GO TO (84,85),KWAL VINPUT.39
84 UEDGE(J) = USURF/(1.+Y(J)/R(3)) VINPUT.40
GO TO 83 VINPUT.41
85 UEDGE(J) = U8(3) VINPUT.42
83 CONTINUE VINPUT.43
U(JMX+1,3) = UEDGE(JMX+1) VINPUT.44
U(JMX+2,3) = UEDGE(JMX+2) VINPUT.45
30 CONTINUE VINPUT.46
I = 3 VINPUT.47
U(1,I) = 0. VINPUT.48
W(1,I) = 0. VINPUT.49
SINAZ = SIN(SANGLE*0.01745329252) VINPUT.50
W8(3) = U8IN*SINAZ VINPUT.51
W8(1) = W8(3) VINPUT.52
W8(2) = W8(3) VINPUT.53
C USTR = SQRT(U8(3)**2 + W8(3)**2) VINPUT.54
C USTR = SQRT(USURF**2 + W8(3)**2) VINPUT.55
C INPUT THE INITIAL CHORD AND SPAN WISE VELOCITY PROFILES VINPUT.56
DO 310 J=2,JMX VINPUT.57
U(J,I) = USTR*U(J,I) VINPUT.58
W(J,I) = USTR*W(J,I) VINPUT.59
310 CONTINUE VINPUT.60
J = JMX + 1 VINPUT.61
DO 315 JJ=J,100 VINPUT.62
U(JJ,I) = U(J-1,I) VINPUT.63
W(JJ,I) = W(J-1,I) VINPUT.64
315 CONTINUE VINPUT.65
DO 400 J=1,100 VINPUT.66
U(J,2) = U(J,3) VINPUT.67
VINPUT.68
VINPUT.69
VINPUT.70

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W(J,2) = W(J,3)
400 CONTINUE
RETURN
END

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VINPUT.71
VINPUT.72
VINPUT.73
VINPUT.74

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SUBROUTINE VVEL(V,X,LST2,XSTART,Y,U,GNUT,GNU,P,DUDY,VINT,JMX,U8)
C ROUTINE TO CALCULATE V PROFILE.
DIMENSION V(1),X(1),Y(1),U(100,3),GNUT(100,3),P(1),DUDY(100,3)
DIMENSION U8(1)
COMMON/MARY/OXS
KVT = 1
V(1) = 0.
VINT = .003
VINT = .0002
GO TO (5066,68), LST2
5066 CONTINUE
IF(X(3)-(XSTART+4.*OXS)) 67,67,68
67 CONTINUE
V(1)=0.
V(JMX)=.0125*U8(3)
SLOPE = (V(JMX)-V(1))/(Y(JMX)-Y(1))
IF(P(3).LE.0.) KVT = 2
IF(KVT.LE.1) SLOPE = -SLOPE
DO 1700 J=1,JMX
V(J)= SLOPE*Y(J)
1700 CONTINUE
GO TO 69
68 CALL VELY(V,U,3,X,Y)
69 CONTINUE
RETURN
END

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VVEL.2
VVEL.3
VVEL.4
VVEL.5
VVEL.6
VVEL.7
VVEL.8
VVEL.9
VVEL.10
VVEL.11
VVEL.12
VVEL.13
VVEL.14
VVEL.15
VVEL.16
VVEL.17
VVEL.18
VVEL.19
VVEL.20
VVEL.21
VVEL.22
VVEL.23
VVEL.24
VVEL.25
VVEL.26
VVEL.27

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SUBROUTINE YPRESS
COMMON/ SCRAT / ALFS(200),CBETA(200),Y(100),JY(25),JYT(25),OY(25),YPRESS.3
1 XX(25),YPL(100),YO(100),CF(200),YDD(100),U(100,3),UT(100),V(100),YPRESS.4
2 GAM1(100),GAMF(100),H(200),US(100),YY(100),UR(100),UUR(100), YPRESS.5
3 UP(100),W(100,3),R(400),BW(400),YDEL(100),GNUT(100,3),DU(200), YPRESS.6
4 UTABLE(100),DUDY(100,3),PS(100,3),SP(100,3),THETA(200), YPRESS.7
5 DXD(20,30),OPC(20,30),UUC(20,30),UEDGE(100),WP(100),XPG(100), YPRESS.8
6 UPG(100),WC(100),BETA(100),RTAB(50),G(99),GW(99),A3(100),A31(100) YPRESS.9
7,A4(100),DUMHY(452)
COMMON/SZ1/ JMX,LMX,NP,UTS,ITRMX,WT,KWAL,DX,U8IN
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
COMMON/CURPT/KDD
COMMON/ PRESSUR / P
COMMON/SZ3/X,U8
COMMON/ CURV1 / R(3)
COMMON/DELGF0/ODELTA
COMMON/STAT/PHREF,UREF
COMMON/PLUB/NCPX,NCPY,KCP,YDELP
COMMON/STP/KSTP
COMMON/XTB/XTB(30)
DIMENSION X(3),U8(3),P(3)
JMX1 = JMX-1
PKKP = 8./3.
KDD = 1
I = 3
USURF = UBFNT(X(3),U8IN)
SPJMX = 1.- (USURF/UREF)**2
PS(JMX,1) = -P(1)
SP(JMX,1) = SPJMX
GO TO (10,20)KWAL
20 CONTINUE
DO 100 J=1,JMX1
PS(J,1) = -P(1)
SP(J,1) = SPJMX
100 CONTINUE
GO TO 910
10 CONTINUE

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YPRESS.2
YPRESS.3
YPRESS.4
YPRESS.5
YPRESS.6
YPRESS.7
YPRESS.8
YPRESS.9
YPRESS.10
YPRESS.11
YPRESS.12
YPRESS.13
YPRESS.14
YPRESS.15
YPRESS.16
YPRESS.17
YPRESS.18
YPRESS.19
YPRESS.20
YPRESS.21
YPRESS.22
YPRESS.23
YPRESS.24
YPRESS.25
YPRESS.26
YPRESS.27
YPRESS.28
YPRESS.29
YPRESS.30
YPRESS.31
YPRESS.32
YPRESS.33
YPRESS.34
YPRESS.35
YPRESS.36
YPRESS.37
YPRESS.38

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DXX      = (X(I)-X(I-1))/12.
DO 901 I = 2,3
SA = 0.
USURF = UBUNT(X(I),UBIN)
SPJMX = 1.- (USURF/UREF)**2
SP(1,1) = SPJMX
PHIJMX = SPJMX*.5*UREF**2 + PHREF
DO 900 J=2,JMX1
GO TO (50,60),KDD
50 J1      = J
   J2      = J1-1
   GO TO 70
60 J1      = JMX1 - (J-1)
   J2      = J1 + 1
70 CONTINUE
   IF(I.LE.2) GO TO 71
   UINT = .5*(UP(J1)**2 + UP(J2)**2)
   GO TO 72
71 CONTINUE
   UINT = .5*(U(J1,I)**2 + U(J2,I)**2)
72 CONTINUE
   RINT = 1./(R(I) + .5*(Y(J1) + Y(J2)))
   XINT = (Y(J1) - Y(J2))*UINT*RINT
   SA = SA + XINT
   PHI = PHIJMX + SA
   SP(J1,I) = (PHI - PHREF)/(1.5*UREF**2)
900 CONTINUE
901 CONTINUE
   GO TO(1,2),KCP
2 CONTINUE
   DO 902 J = 1,JMX1
   PS(J,3) = ((SP(J,3) - SP(J,2))/DXX)*.5*UREF**2
902 CONTINUE
   GO TO 910
1 CONTINUE
   KSTP = 1
   L = 2
   XPZ = X(3)
   CALL PFIELD(L,XPZ,P,Y,XTB)
   KSTP = 2
910 CONTINUE
   RETURN
   END

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YPRESS.39
 YPRESS.40
 YPRESS.41
 YPRESS.42
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 YPRESS.81

OVERLAY (FR15,4,0)

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PROGRAM FELOPT
COMMON /PARAM/ MACH,ALPHA,REFA,MATIN
COMMON /ITR/ ITR,ITRMAX
COMMON /JMAX/ JMAX
COMMON/NPT/NPT
COMMON /VELCOM/ NPANEL,NPART,IMAX,EX,PRINT
COMMON /SCRAT/ SINBD(600),COSBD(600),TANBD(600),UL(600),WL(600),
1UC(600),WC(600),AC(600),DUM(1200),XPT(600),ZPT(600),
2UCJ(2),WCJ(2),ULJ(2),WLJ(2),DUMMY(1592)
COMMON/GAMM/GA(600),0
COMMON/POINT/ARRAY(4950)
COMMON /SEG/ NCMPT,NFLAP,NFLP,NC(4),TE(4),GTU(4),GTL(4),
1NPU(4),NPL(4),ISTG(4),UCU(4),UCL(4),WCU(4),WCL(4),
2XTE(4),ZTE(4),DELZ(3),NG(3),NPG(4),THKTE(4)
COMMON /GRID/ ZCP(20),CPI(20,30),ZGAP
COMMON /XIN/ XIN(100),ZIN(100),CPIN(100),SU(100)
DIMENSION DELTA(600),THET(600),CHORD(600),XP(600),ZP(600),
1XU(30,4),ZU(30,4),XL(30,4),ZL(30,4),XCOR(600),ZCOR(600),
2XGRID(30,3),ZGRID(30,3),DZDX(30,3),Q(600)
EQUIVALENCE (ARRAY,DELTA),(ARRAY(601),THET),(ARRAY(1201),CHORD),
1(ARRAY(1801),XP),(ARRAY(2401),ZP),
2(ARRAY(3001),XU),(ARRAY(3121),XL),
3(ARRAY(3241),ZU),(ARRAY(3361),ZL),

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FELOPT.3
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 FELOPT.24
 FELOPT.25

4	(ARRAY(3481),XGRID),(ARRAY(3571),ZGRID),(ARRAY(3661),DZDX)*	FELOPT.26
5	(ARRAY(3751),XCOR),(ARRAY(4351),ZCOR)	FELOPT.27
	REAL MACH	FELOPT.28
	EPS=1.0E-6	FELOPT.29
	PI=3.14159265	FELOPT.30
	REFA=1.0	FELOPT.31
	KTE = 0	FELOPT.32
	DO 1 N =1,NCMPT	FELOPT.33
	IF(1MKTE(N).GT.0.) KTE = 1	FELOPT.34
1	CONTINUE	FELOPT.35
	NCPZ=20	FELOPT.36
	REWIND 3	FELOPT.37
	NF=NFLAP-NFLP*1	FELOPT.38
	NGRID=NG(NF)	FELOPT.39
	NPP = NCMPT-NFLAP*NF	FELOPT.40
	NP = NPT-NPU(NPP)+NPG(NPP)-1	FELOPT.41
	CALL SECOND(TIME)	FELOPT.42
	WRITE(6,602) TIME	FELOPT.43
	REWIND 7	FELOPT.44
	READ(7) ARRAY	FELOPT.45
	REWIND 7	FELOPT.46
5	CONTINUE	FELOPT.47
	IF(ITR.GT.1) GO TO 8	FELOPT.48
	DO 7 J=1,JMAX	FELOPT.49
	Q(J) = 0.	FELOPT.50
7	CONTINUE	FELOPT.51
8	CONTINUE	FELOPT.52
	ALP=ALPHA/57.2957795	FELOPT.53
	COSAL=COS(ALP)	FELOPT.54
	SINAL=SIN(ALP)	FELOPT.55
	BT2=1.-MACH*MACH	FELOPT.56
	RB2=1.0/BT2	FELOPT.57
	BETA=SQRT(BT2)	FELOPT.58
	CON=1./(2.*PI)	FELOPT.59
	RCON=BETA*CON	FELOPT.60
	XSTART=XGRID(1,NF)	FELOPT.61
	ZSTART=ZGRID(1,NF)	FELOPT.62
	DXG=XTE(NF)-XSTART	FELOPT.63
	DZG=ZTE(NF)-ZSTART	FELOPT.64
	ZGAP = DZG	FELOPT.65
	DO 10 M=1,NCPZ	FELOPT.66
10	ZCP(M) = DELZ(NF)*FLOAT(M-1)	FELOPT.67
	DO 50 N=1,NPANEL	FELOPT.68
	BD=BETA*TAN(DELTA(N))	FELOPT.69
	TANBD(N)=BD	FELOPT.70
	COSBD(N)=1./SQRT(1.+BD*BD)	FELOPT.71
50	SINBD(N)=BD*COSBD(N)	FELOPT.72
	I=0	FELOPT.73
	DO 300 IN=1,NGRID	FELOPT.74
	I=I+1	FELOPT.75
	XPT(1)=XGRID(IN,NF)	FELOPT.76
	ZPT(1)=ZGRID(IN,NF)	FELOPT.77
	CPI(1,IN)=CPIIN(IN*NP)	FELOPT.78
	UPT=0.	FELOPT.79
	DZX=DZDX(IN,NF)	FELOPT.80
	COSD=1.0/SQRT(1.0+DZX*DZX)	FELOPT.81
	SIND=COSD*DZX	FELOPT.82
	DO 300 IM=2,NCPZ	FELOPT.83
	I=I+1	FELOPT.84
	ZPT(I)=ZGRID(IN,NF)+ZCP(IM)*COSD	FELOPT.85
	XPT(I)=XGRID(IN,NF)-ZCP(IM)*SIND	FELOPT.86
	IF(ITR.GT.1.AND.KTE.EQ.0) GO TO 292	FELOPT.87
	IF(ITR.GT.2) GO TO 292	FELOPT.88
	XI=XPT(I)	FELOPT.89
	ZI=ZPT(I)	FELOPT.90
	J=0	FELOPT.91
	K=0	FELOPT.92
	JL=0	FELOPT.93
	JT=0	FELOPT.94

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DO 275 N=1,NCMPT
JL=JT+1
JT=JT+NC(N)-2
UCJT=0.
WCJT=0.
DO 250 NSIDE=1,2
IF(NSIDE,EQ.1) NL=NPU(N)-1
IF(NSIDE,EQ.2) NL=NPL(N)-1
NL1=NL+1
DO 225 L=1,NL
J=J+1
K=K+1
IF(I.GT.1) GO TO 58
IF(NSIDE,EQ.2) GO TO 55
XC=XU(L+1,N)-XU(L,N)
ZC=ZU(L+1,N)-ZU(L,N)
GO TO 56
55 XC=XL(L+1,N)-XL(L,N)
ZC=ZL(L+1,N)-ZL(L,N)
56 CHORD(K)=SQRT(XC*XC+BT2*ZC*ZC)
58 DO 100 M=1,2
L1=L+M-1
IF(NSIDE,EQ.2) GO TO 60
DX=XI-XU(L1,N)
DZ=(ZI-ZU(L1,N))*BETA
GO TO 80
60 DX=XI-XL(L1,N)
DZ=(ZI-ZL(L1,N))*BETA
80 XPM=DX*COSBD(K)+DZ*SINBD(K)
ZPM=DZ*COSBD(K)-DX*SINBD(K)
IF(ABS(XPM).LE.EPS) XPM=0.
IF(ABS(ZPM).LE.EPS) ZPM=0.
RPM2=XPM*XPM+ZPM*ZPM
RPM=0.
IF(RPM2.GT.0.) RPM=SQRT(RPM2)
G=0.
IF(RPM.GT.0.) G=ALOG(RPM)
F=P1/2.
IF(XPM,EQ.0.,AND.ZPM,EQ.0.) GO TO 90
F=ATAN2(ZPM,XPM)
90 CONTINUE
IF(NSIDE,EQ.2,AND.ZPM,EQ.0.) F=-F
UCJ(M)=-F
WCJ(M)=-G
ULJ(M)=-(XPM*F+ZPM*G)/CHORD(K)
WLJ(M)=(ZPM*F-XPM*(1.-G))/CHORD(K)
100 CONTINUE
UCPM=UCJ(1)-ULJ(1)+ULJ(2)
WCPM=WCJ(1)-WLJ(1)+WLJ(2)
ULPM=ULJ(1)-ULJ(2)-UCJ(2)
WLPM=WLJ(1)-WLJ(2)-WCJ(2)
USPM=WCJ(2)-WCJ(1)
WSPM=UCJ(1)-UCJ(2)
UC(J)=(UCPM*COSRC(K)-WCPM*SINBD(K))*CON
WC(J)=(WCPM*COSBD(K)+UCPM*SINBD(K))*BCON
UL(J)=(ULPM*COSRC(K)-WLPM*SINBD(K))*CON
WL(J)=(WLPM*COSBD(K)+ULPM*SINBD(K))*BCON
USJ=(USPM*COSBD(K)-WSPM*SINBD(K))*BCON
WSJ=(WSPM*COSBD(K)+USPM*SINBD(K))*CON
UCJT=UCJT+USJ
WCJT=WCJT+WSJ
IF(NSIDE,EQ.2,AND.L,EQ.1) GO TO 160
IF(L.GT.1) UC(J)=UC(J)+UL(J-1)
IF(L.GT.1) WC(J)=WC(J)+WL(J-1)
GO TO 200
160 UC(JL)=UC(JL)+UC(J)
WC(JL)=WC(JL)+WC(J)
UL(J-1)=UL(J)
WL(J-1)=WL(J)

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FELOPT.162
FELOPT.163

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J=J-1
GO TO 225
200 CONTINUE
IF(L,LT,NL) GO TO 225
IF(NSIDE,EQ,2) GO TO 220
UCU(N)=UL(J)
WCU(N)=WL(J)
GO TO 225
220 UCL(N)=UL(J)
WCL(N)=WL(J)
225 CONTINUE
250 CONTINUE
J=J+1
UC(JT)=UCJT
WC(JT)=WCJT
IF(THKTE(N),EQ,0..OR,ITR,GT,1) GO TO 275
UC(JT)=0.
WC(JT)=0.
275 CONTINUE
J=0
K=0
DO 290 N=1,NCMPT
J2=NC(N)
J1=J2-1
JT=J2-2
DO 290 JJ=1,J2
J=J+1
IF(JJ,GT,JT) GO TO 285
K=K+1
UL(J)=UC(K)
WL(J)=WC(K)
GO TO 290
285 IF(JJ,EQ,J2) GO TO 286
UL(J)=UCU(N)
WL(J)=WCU(N)
GO TO 290
286 UL(J)=UCL(N)
WL(J)=WCL(N)
290 CONTINUE
WRITE(3) (UL(J),WL(J),J=1,JMAX)
GO TO 294
292 CONTINUE
READ(3) (UL(J),WL(J),J=1,JMAX)
294 CONTINUE
UPT=0.
WPT=0.
DO 295 J=1,JMAX
UPT=UPT+UL(J)*GA(J)-WL(J)*Q(J)*RB2
295 WPT=WPT+WL(J)*GA(J)+UL(J)*Q(J)
UPT=UPT+COSAL
WPT=WPT+SINAL
CPI(IN,IN)=1.0-UPT*UPT-WPT*WPT
300 CONTINUE
CALL SECOND(TIME)
WRITE(6,602) TIME
RETURN
500 FORMAT(11I5)
501 FORMAT(7F10.2)
601 FORMAT(1H ,10F10.5)
602 FORMAT(1H ,6HTIME =,F10.5)
660 FORMAT(7I5,9F10.5)
END

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