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IMPROVED SONIC-BOX COMPUTER PROGRAM FOR CALCULATING TRANSONIC AERODYNAMIC LOADS -ON OSCILLATING WINGS WITH THICKNESS

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IMPROVED SONIC-BOX COMPUTER PROGRAM FOR CALCULATING TRANSONIC AERODYNAMIC LOADS ON OSCILLATING WINGS WITH THICKNESS

By S. Y. Ruo Lockheed-Georgia Company

- SUMMARY

A computer program has been developed to account approximately for the effects of finite wing thickness in the transonic potential flow over an oscillating wing of finite span. The program is based on the original sonicbox program of Rodemich and Andrew which has previously been extended by Ruo and Theisen to account for the effects of wing thickness. The latter work is further extended herein to improve computational efficiency and accuracy and to account for swept trailing edges. Account for the non-uniform flow caused by finite thickness is made by application of the local linearization concept with appropriate coordinate transformation. A brief description of each computer routine and the applications of cubic spline and the spline-surface data fitting techniques in the program are given, and the method of input is shown in detail. Sample calculations as well as a complete listing of the computer program are presented.

INTRODUCTION

In reference 1, the sonic-box method computer program was developed for calculation of unsteady transonic flow aerodynamics for oscillating planar wings with unswept trailing edge by approximating the wing planform with a matrix of square boxes. Later, it was extended to include the swept trailing edge and control surfaces in reference 2. Sonic-box method uses a velocitypotential doublet as the basic solution to satisfy the linearized transonic flow, unsteady small-perturbation velocity-potential equation with the associated boundary conditions.

In reference 3, the wing thickness effect is partially recovered by the . inclusion of local Mach number in the governing equation for the unsteady

transonic flow. It uses the concept of local linearization to reduce the nonlinear small-perturbation equation to a linear one with non-constant coefficients. This is further reduced to a linear equation with constant coefficients by the appropriate coordinate transformation. This final equation and the associated boundary condition in the transformed space become identical to those treated in the physical space by Rodemich and Andrew in reference 1. The numerical results for the wing with thickness were obtained by adopting the sonic-box method in the transformed space. Because of the assumptions made in deducing the governing equation to a manageable form, this technique is applicable only to the thin wings. That is, the local mean Mach number on the wing surface must not be very different from unity. Further, it is assumed that there is no flow separation and no strong shock waves on the wing surface.

The computer programs developed in references 1, 2, and 3 use the leastsquare method to fit some of the input data, such as wing deflection or steady Mach number distribution on the wing, and to fit the computed velocity potential with a form of predetermined polynomial surface for the subsequent calculation of the unsteady pressure and the generalized aerodynamic force coefficients. For wings with a rapidly changing Mach number distribution or wing motions in certain deflection mode shapes, the polynomial surface is not adequate because of its inaccuracy.

The computer program described in this report adopts the natural cubic spline for fitting calculated velocity potential and the spline-surface for fitting input modal deflections and Mach number distribution instead of the polynomial-surface fitting used in references 1, 2, and 3. The present computer code allows the computation of generalized aerodynamic force coefficients for wings of zero and finite thickness; the swept trailing edges are allowed but not the control surfaces. It also uses a different scheme from that of reference 3 for calculation of the generalized aerodynamic force coefficients for wings with finite thickness to improve the efficiency of the program and the accuracy of the numerical results. This is done by performing the force coefficient integration in the transformed space where the velocity potential is computed rather than map the velocity potential from the transformed space

to the physical space before performing the integration as in reference 3. Additionally, the contribution from the partial boxes along the swept leading edge has been included to improve convergence and accuracy of the numerical results with a smaller total number of boxes in representing the wing planform.

The wing is assumed to have zero mean angle of attack, and the same mean Mach number distribution on upper and lower surfaces, and to perform motions symmetric with respect to the root chord. These, however, are not limited by the basic concept.

The regular output of the present computer code is the generalized aerodynamic force coefficients. In addition to these, the values of downwash, velocity potential, pressure coefficient and Mach number at each box center may be printed out. Also the portion of the dimensionless area representing the actual wing planform in each box and the information of the arrangement of the boxes used in the computation as well as the velocity influence coefficients may be printed out. Since no provision is made in the computer code to smooth any computed data, the pressure coefficient must be used with caution.

SYMBOLS

a ₀ , a ₁ , a ₂	constants
Bij	area of ij-th box on wing (i-th spanwise column and j-th
-	chordwise row) .
b	reference length (dimension = L)
۲ _р	pressure coefficient
dj	x-direction distance between two adjacent points used in
	the spline-curve fit, equation (14)
e, exp	exponential function
f(x,γ)	wing deflection mode shape
$G_1(x,y),G_2(y)$	leading edge adjustment terms, see equation (10)

H(x,y)	dependent variable represented by a cubic spline or spline-
	surface, see equations (14) and (15)
h;	constant
Ī	integrated value, see equation (13)
I	√-1
k	reduced frequency, $\omega b/U_{\infty}$
L	unit of length
Lii	generalized aerodynamic force coefficient
M(x,y)	local Mach number
Mj	coefficients of cubic spline
N	number of points used in data fitting
r;	dimensionless distance between two points, $\sqrt{(x-x_i)^2+(y-y_i)^2}$,
	(reference length = b)
S	dimensionless wing planform area of full wing (reference
	$area = b^2$)
t	dimensionless time (reference time = b/U_{∞})
т	unit of time
U∞	reference velocity (freestream), (dimension = L/T)
w(x,y)	dimensionless downwash (reference velocity = U_{∞})
x,y,z	dimensionless Cartesian coordinates (reference length = b)
x _{le} (y)	dimensionless x-coordinate of wing leading edge (reference
	length = b
x _{te} (y)	dimensionless x-coordinate of wing trailing edge (reference
	length = b)
У _{max}	dimensionless maximum semi-span (reference length = b)
θij	phase angle of L _{ij}
τ	maximum thickness to chord ratio
φ _o (x,y)	dimensionless velocity potential of doublet
ψ(x,y)	downwash at point (x,y) due to doublet of unit strength at
	the origin, see equation (6)
ω	angular velocity (dimension = radian/T)
\bigcirc	superscript denotes the dimensional quantity of the correspond-
	ing dimensionless variable shown inside the parentheses
(~)	superscript denotes the quantity in the transformed space
	of the corresponding variable shown inside the parentheses

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MAJOR VARIABLES IN COMPUTER PROGRAM

Some variables used in the computer program are described briefly in this section. The subroutine name in the parentheses following the description of a variable indicates where its value is generated or defined. The number appearing in the parentheses indicates the value of the variable for the corresponding condition described. In the following, N=1 and N=2 indicate, respectively, the real and the imaginary parts of a variable; NEW=1 and NEW=2 indicate, respectively, the zero thickness and nonzero thickness cases; i $(i \le MB)$ is related to the chordwise coordinate while j $(j \le MB)$ is related to the spanwise coordinate.

A(N,j,i)	influence coefficient, the integral in equation (6); the
	upwash at the center of a box caused by a unit doublet
	distribution over another box separated from the former
-	by (j-1) number of boxes in spanwise direction and (i-1)
	number of boxes in chordwise direction, (POT2)
AMA(j,i,NEW)	Mach number at center of ij-th box on physical wing (NEW=1),
	Mach number at a point on physical wing corresponding to
	the center of ij-th box on the transformed wing (NEW=2),
	(SHAPE)
AR(j,i,NEW)	area of wing in ij-th box, (PLNFM)
AREA	area of the physical, full wing planform, (PLNFM)
СК	reduced frequency, (MAIN)
CTE(j)	Mach number on the physical wing at a point corresponding
	to the trailing edge of the j-th chordwise row of the
	transformed wing, (SHAPE)
D	length of box side, (MAIN)
DA(k)	input data, (DATRD)
DH	one-half of the length of box side, (MAIN)
DI	maximum number (real) of boxes in streamwise direction
	(same as L integer), (MAIN)
EDG(NEW,j)	value of leading edge adjustment term G_2 in equation (10)
	at j-th chordwise row, (SHAPE)

IEDG	flag to identify whether the most outboard section of the loading edge is parallel (1) or is not applied (0) to the
	froostroom (SHAPE)
I D	accounter read-unit number (MAIN)
	computer read-unit number, (MAIN)
	computer write-unit number, (MAIN)
JMAK (NEW)	number of boxes on the wing along spanwise direction, (SHAPE)
JMAX (NEW)	number of boxes on wing plus wake along spanwise direction, (SHAPE)
KSFD(M)	number of points used in spline-surface fit of wing
	deflections in M-th mode, (DRED)
KSFM	number of points used in the spline-surface fit of
	Mach number, (MRED)
L	maximum number (integer) of boxes in streamwise direction,
	(MAIN)
м	deflection mode number, M ≤ MD, (MAIN)
МВ	maximum number of boxes in streamwise direction corresponding
	to the dimension of those subscripted variables related to
	the box distribution, (MAIN)
MD	maximum number of deflection modes allowed, corresponding to
	the dimension of those subscripted variables related to
	deflection mode, (MAIN)
ML(NEW,I)	number of boxes, including partial boxes, in i-th spanwise
	column, (PLNFM)
MLC(NEW,k,i)	sequential number of first (k=1) and last (k=2) wing box
	in the i-th spanwise column, (PLNFM)
MLT(NEW,k,j)	sequential number of first (k=1) and last (k=2) wing box
	in the j-th chordwise row, (SHAPE)
MLW(NEW,i)	sequential number of first wake box next to the wing box
	in i-th spanwise column, (PLNFM)
NB	number of points to be used in the spline-surface fit,
	corresponding to the dimension of those subscripted
	variables related to the spline-surface, (MAIN)
NEDGI	maximum number of points allowed to describe the in-
	put leading edge of the wing, (MAIN)
NEW	index for physical (1) or transformed (2) wings, (MAIN)
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NM	NB+3, (MAIN)
NS (NEW)	number of leading edge points on the wing semispan,
	including point at apex only if the wing is pointed,(SHAPE)
NSMAX	maximum number of leading-edge points (including apex of
	pointed wing) that can be used to approximate leading edge
	of transformed wing corresponding to the dimension of those
	subscripted variables related to the leading-edge points
	used in computation, (MAIN)
NST(NEW)	number of trailing-edge points including the point at wing
	root, NST(1) ≤ NTDGI-1, (SHAPE)
NTDGI	maximum number of points allowed to describe the input
	trailing edge of the wing, (MAIN)
S(N,j,i)	downwash at the center of ij-th box, equation (8), (WVAL),
	and velocity potential at the center of ij-th box, (BOXPO)
SFDH(k,M,NEW)	known wing deflection at those points used in spline-
	surface fit of wing deflections in M-th mode; or, the
	coefficients in wing-deflection, spline-surface expression
	for M-th mode, $k \leq NM$, (DRED)
SFDX(k,M)	x and y coordinates of points used in spline-surface fit of
SFDY(k,M,NEW)	wing deflections in M-th mode, $k \leq NB$, (DRED)
SFMH(k)	known Mach number at those points used in spline-surface fit
	of Mach number; or, the coefficients in Mach number spline-
	surface expression, k ≤ NM, (MRED)
SFMX(k)	x and y coordinates of points used in spline-surface fit of
SFMY (K)	Mach number, k ≤ NB, (MRED)
T(k,l)	dimensioned temporary storage, $k \leq NM$ and $\ell \leq (NM+1)$
XEDG(k)	x and y coordinates of those points used to describe the
YEDG(K)	wing leading edge in the computations, $k \leq NSMAX$, (SHAPE) -
XEDG1(k)	x and y coordinates of those input points used to describe
YEDGI(K)	the wing leading edge in physical space, k ≤ NEDGI, (SHAPE)
XLE(NEW,j)	x-coordinate of leading and trailing edge along j-th
XIE(NEW,]]	chordwise row, (PLNFM)
XTDG(k)	x and y coordinates of those points used to describe the
	wing trailing edge in the computations, (SHAPE)
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XTDGI(k) YTDGI(k)	x and y coordinates of those input points used to describe
	the trailing edge in physical space, k \leq NTDGI, (SHAPE)
XX(i)	x-coordinate of i-th spanwise column, (SHAPE)
YMAX(NEW)	maximum y dimension of the wing, (SHAPE)
YY(j)	y-coordinate of j-th chordwise row, (SHAPE)

EQUATIONS USED IN THE COMPUTER PROGRAM

In this section, some equations and expressions used in the present version of sonic-box method computer program are listed. Additional information on the derivation of these equations can be found in the standard text books or numerous other publications (e.g., refs. 1, 4, and 6).

Small Perturbation Potential Equation

The governing equation of the unsteady part of the harmonically oscillating thin wing in a sonic flow field can be written as

$$\varphi_{0_{YY}} + \varphi_{0_{ZZ}} - M^2 (2ik\varphi_{0_X} - k^2\varphi_0) = 0$$
 (1)

and

$$\mathfrak{C}(x,y,z,t) = \mathfrak{C}_{0}(x,y,z) e^{ikt}$$
.

When M = 1 everywhere, equation (1) reduces to the familiar linearized equation. However, if the variation of local Mach number is taken into account, local linearization may be applied to obtain the following equation valid in a small region

φ̃≈ Mφ..

$$\tilde{\varphi}_{0\tilde{y}\tilde{y}} + \tilde{\varphi}_{0\tilde{z}\tilde{z}} - (2ik\tilde{\varphi}_{0\tilde{x}} - k^2\tilde{\varphi}_0) = 0$$
(2)

where

 $\tilde{x} = x$ (3) $\tilde{y} = My$ $\tilde{z} = Mz$



Equation (2) is a linear equation with constant coefficients and is the same as the familiar linearized equation with M=1 (eq.(1)). Therefore, the problems of wing with finite thickness can be solved in the transformed space with a method suitable for the problems of zero thickness wing in the physical space. The sonic-box method (ref. 1) has been chosen for the present implementation. A solution to the linearized form of equation (1), when M=1, can be written as (ref. 1)

$$\varphi_{0}(x,y,z) = \begin{cases} 0, \ x \leq 0 \\ \frac{ik}{2\pi} \frac{z}{x^{2}} \exp \left[-\frac{ik}{2} \left(x + \frac{y^{2} + z^{2}}{x}\right)\right], \ x>0 \end{cases}$$
(4)

and in the wake

 $\varphi_{o}(x,y,0) = \varphi_{o_{te}} \exp[-ik(x-x_{te})], x > x_{te} \text{ and } z = 0,$ (5)

which represents a doublet at the origin of coordinates pulsating with reduced frequency k. An expression for downwash at any point on a wing lying approximately in the xy-plane due to a unit doublet at the coordinate origin can be obtained by taking partial differentiation of equation (4) with respect to z and letting z go to zero. The approximate solution to equation (2) with a known downwash distribution on a lifting surface, which is approximated by a matrix of square boxes and the velocity potential is considered to be constant within each box and equal to that at the box center, can be expressed as:

$$\sum_{i',j'} \varphi_{0} \iiint_{B_{i'j'}} \psi(x_i - \xi, y_j - \eta) d\xi d\eta = w(x_i, y_j)$$
(6)

where $\varphi_{0iij} = magnitude of velocity potential at the center of box B_{iij}$

$\psi(x_i - \xi, y_j - \eta) = downwash at (x_i, y_j) due to doublet of unit strength at (\xi, \eta).$

$$= \frac{ik}{2} \frac{1}{(x_{1}-\xi)^{2}} \exp \left\{ -\frac{1}{2}ik \left[(x_{1}-\xi) + \frac{(y_{j}-\eta)^{2}}{(x_{1}-\xi)} \right] \right\};$$
(7)

 $w(x_{i}, y_{j}) = \left(\frac{\partial \varphi_{o}}{\partial z}\right)_{at} (x_{i}, y_{j}) = downwash at the center of box B_{ij}$.

Downwash is related to the deflection mode shape in physical space as

$$\frac{\partial \varphi_0}{\partial z} = \frac{\partial f}{\partial x} + ikf$$
(8a)

and in the transformed space as

$$\frac{\partial \Phi_{0}}{\partial \tilde{z}} = \frac{1}{M} \left(\frac{\partial \tilde{f}}{\partial \tilde{x}} + i k \tilde{f} \right).$$
(8b)

Since the left-hand sides of equations (8a) and (8b) are identical, the downwash at (\tilde{x}, \tilde{y}) on the transformed wing is unchanged from that at the corresponding point, (x,y), on the physical wing.

It is not possible to arrange the center of the box to follow the wing leading edge with the sonic-box method. Before the pressure coefficient and the generalized aerodynamic force coefficients are calculated, it is recommended to adjust the computed velocity potential near the leading edge to conform to the theoretically known leading edge condition (e.g., $\varphi_{le} = 0$ for a swept (subsonic) leading edge). This adjustment is expressed as

$$\varphi_{0}^{\prime} = G_{1} \cdot G_{2} \cdot \varphi_{0} , \qquad (9)$$

where G_1 and G_2 , depending solely on the shape of the wing leading edge, are:

$$\begin{array}{ll} x - x_{\&e} \geq \Delta x \colon & G_{1} = 1.0 \\ x - x_{\&e} \leq \Delta x \colon & G_{1} = \sqrt{\frac{x - x_{\&e}}{\Delta x}} \left\{ \sqrt{\frac{x + x_{\&e}}{2x_{\&e} + \Delta x}} \right\}^{m} , \begin{cases} m=0 \text{ for } y \neq 0 \text{ at } x=0 \\ m=1 \text{ for } y=0 \text{ at } x=0 \end{cases} \\ y_{max} - y \geq \Delta y \colon & G_{2} = 1.0 \\ y_{max} - y \leq \Delta y \colon & G_{2} = \left\{ \sqrt{\frac{y_{max}^{2} - y^{2}}{\Delta y(2y_{max} - \Delta y)}} \right\}^{n} , \begin{cases} n=0 \text{ for } \frac{dy}{dx} \neq 0 \text{ at } x=1 \\ n=1 \text{ for } \frac{dy}{dx} = 0 \text{ at } x=1 \end{cases} \end{cases}$$

$$\begin{array}{c} (10) \\ \end{array}$$

where

 x_{le} (y) = x coordinate of wing leading edge at y = constant

,= y coordinate of the wing tip _ Y_{max} = range of x for which leading-edge adjustment is applied . ΥĽ range of y for which leading-edge adjustment is applied. J۷

The selection of the range for leading-edge adjustment is arbitrary depending . on how extensively one wants to impose the leading-edge property on the calculated velocity potential. For example, if one choses $\Delta x = x_{te} - x_{le}$ and $\Delta y = y_{max}$, the resulting adjustment becomes identical to that used in earlier versions of sonic-box method computer program. Presently, both Δx and Δy are set to the length of the box side used in computation. These relationships are depicted in figure 2.

Pressure Coefficient

The unsteady pressure coefficient for the harmonically oscillating thin . wing is obtained from Bernoulli's equation as

Generalized Aerodynamic Force Coefficient

The generalized aerodynamic force coefficient as defined in reference ⁷ 6 is written as

ŝ

and

$$L_{ij} = \frac{8}{S} \iint_{S} (\Psi_{0_{X}} + ik\Psi_{0})_{i} f_{j} dxdy$$
(12a)
$$= \frac{8}{S} \iint_{M2} (\tilde{\Psi}_{0_{X}} + ik\tilde{\Psi}_{0})_{i} \tilde{f}_{j} d\tilde{x}d\tilde{y}.$$
(12b)

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An integration by parts is performed to cast the integral in equation (12) into the following form:

$$I = \int_{Y} \left[\left(\varphi_{0} f \right)_{x=x_{te}} - \int_{x} \left(f_{x}+ikf \right) \varphi_{0} dx \right] dy, \quad x, y \text{ on } S, \qquad (13a)$$

$$\tilde{i} = \int_{\tilde{Y}} \left[\left(\frac{1}{M^2} \tilde{\phi}_0 \tilde{f} \right)_{\tilde{X} = \tilde{X}_{te}} - \int_{\tilde{X}} \frac{1}{M^2} \left(\tilde{f}_{\tilde{X}} + ik\tilde{f} \right)^{\tilde{\phi}}_0 d\tilde{x} \right] d\tilde{y}, \quad \tilde{x}, \tilde{y}, \text{ on } \tilde{S}.$$
(13b)

Equation (12b) is integrated in the transformed space using equation (13b).

DATA FITTING METHODS

The polynomial surface method of data fitting was used in the earlier versions of sonic-box computer program (refs. 1, 2, and 3) to fit the wing deflection mode, Mach number, velocity potential and pressure coefficient.

In the present program, two types of data fitting are used. One is a two-dimensional cubic spline fitting and the other is a three-dimensional spline-surface fitting. The former is based on the concept of thin elastic beam and the latter on the thin elastic plate. Since they use different forms of expression, the two-dimensional fitting can not be obtained directly from the three-dimensional fitting by setting the coefficient of the terms involving the extra independent variable to zero as it is usually done when the polynomial fitting is used.

Cubic Spline

<u>Method</u>. - It has been demonstrated over the years that the draftsman's spline has distinct advantage over other methods of fairing curve through a set of predetermined points (e.g.¹, reference 7). The basic equation can be written as

$$H = \frac{M_{j-1}}{6} [(x_j - x^3) + d_j^2 (x - x_{j-1}) - d_j^3] + \frac{M_j}{6d_j} [(x - x_{j-1}^3) - d_j^2 (x - x_{j-1})] + H_{j-1} + T_j (x - x_{j-1}), \quad \text{for } x_{j-1} \le x \le x_j \text{ and } j = 2, N$$
(14)

where $d_j = x_j - x_{j-1}$ H = value of dependent variable at point x $H_j = value of dependent variable at point x_j$ $M_j = coefficients of cubic spline$ N = total number of predetermined points $T_j = (H_j - H_{j-1})/d_j$ $x_j = coordinate of the predetermined points where H is known$

The values of M_j 's are computed with the N known values of H at x_j by requiring the slope at each of these points to have a value computed from both sides of the point. This provides only (N-2) equations for N unknowns, thus the following two additional equations are assumed:

$$M_1 = M_N = 0.$$

<u>Use</u>. - Cubic spline fitting is used in the computation of pressure coefficient and generalized aerodynamic force coefficients according to equations (11) and (13), respectively.

In the computation of pressure coefficient distribution on both physical and transformed wings, the known values of the velocity potential at the center of wing boxes, in the respective spaces, along each chordwise row are fitted with a cubic spline to calculate the chordwise derivative of the velocity potential at the box centers. The velocity potential distribution on the transformed wing is also fitted along each spanwise column to facilitate the interpolation of the velocity potential at the center of wing boxes along the same column on the physical wing.

In the computation of aerodynamic force coefficients, the integration is performed in the space where the velocity potential distribution is calculated and in the sequence of chordwise and then spanwise directions. The cubic spline is used to linearly extrapolate both the velocity potential at the trailing edge of each chordwise row for the chordwise integration and the integrated value of the chordwise integration at the root chord for the spanwise integration. Both chordwise and spanwise integrations are performed with the implied cubic-spline fitting as shown in equation (16).

Spline-Surface

<u>Method</u>. - In reference 8, it is shown that a spline-surface can fit a three-dimensional distribution of data better than the polynomial surface. The expression of the spline-surface can be written as:

$$H = a_0 + a_1 x + a_2 y + \sum_{j=1}^{N} h_j r_j^2 \ln r_j^2, \qquad (15)$$

where

$$\begin{split} r_j^2 &= (x - x_j)^2 + (y - y_j)^2 \\ a_0, a_1, a_2, h_j &= \text{coefficients of spline-surface} \\ H &= \text{value of dependent variable at } (x, y) \\ N &= \text{total number of predetermined points} \\ (x_i, y_j) &= \text{coordinates of the predetermined points where H is known.} \end{split}$$

The values of a_0, a_1, a_2 , and h_j 's are computed with the N known values of H at (x_i, y_j) plus the following three additional relations:

$$\sum_{j=1}^{N} h_{j} = 0$$

$$\sum_{j=1}^{N} h_{j}x_{j} = 0$$

$$\sum_{j=1}^{N} h_{j}y_{j} = 0.$$

This yields (N+3) equations with (N+3) unknowns.

The partial derivatives of equation (15) with respect to x, y can be easily obtained as follows:

$$\frac{\partial}{\partial x} H(x,y) = a_1 + 2 \sum_{j=1}^{N} h_j(x-x_j) \cdot \ln r_j^2$$
$$\frac{\partial}{\partial y} H(x,y) = a_2 + 2 \sum_{j=1}^{N} h_j(y-y_j) \cdot \ln r_j^2$$

<u>Use</u>. - There are five sets of discrete points on the lifting surface which in general do not coincide:

- 1. (x,y) on physical wing where Mach number is known
- 2. (x,y) on physical wing where modal deflection is known
- 3. (x,y) of box centers on physical wing, or (\tilde{x},\tilde{y}) of box centers on transformed wing
- 4. (\tilde{x}, \tilde{y}) on transformed wing corresponding to (x, y) on physical wing where modal deflection is known
- 5. (x,y) on physical wing corresponding to box centers of transformed wing.

In the process of solving equation (6) for the velocity potential, spline-. surface fitting is used to facilitate the interpolation of quantities and calculation of their gradients among these sets of points. The known local Mach number distribution on physical wing is surface-fitted for the interpolation of local Mach number on the physical wing at the box centers (for print-out purpose only), at those points where the modal deflection is specified, and at those points corresponding to the box centers and the trailing-edge points of transformed wing (for use in the evaluation of the integrals in eq. (13b)). The modal deflection points in the physical space are then transformed into transformed space according to equation (3) for nonzero-thickness wing. Note that the modal deflection f(x,y) is unchanged in the transformed space, i.e., $\tilde{f}(\tilde{x}, \tilde{y}) = f(x, y)$. The modal deflection, in the physical space for zero-thickness wing and in the transformed space for nonzero-thickness wing, is surface-fitted to facilitate the evaluation of the modal deflection and its chordwise derivative at box centers and the modal deflection at trailing edge as required in equation (8) for downwash and in equation (13) for force coefficient in the respective spaces.

When the modal deflection of the physical wing is expressed in a functional form, a number of points (i.e., box centers) on the transformed wing are selected for specifying the modal deflection and the corresponding points on the physical wing are then located with the aid of the surface-fitted Mach number. The modal deflection at each of these points on the physical wing is then calculated with the known expression and this, in turn, is the value at each of the corresponding points on the transformed wing.

PROGRAM FLOW

The flow chart of the program SBOXR is presented in figure 1. The function of those controlling variables appeared in the flow chart is as follows:

Variable	Value	Function
NEW	1	Indicates case without thickness effect
	2	Indicates case with thickness effect
	0	Indicates first frequency for a wing
DA(26)	1	Indicates additional frequency for the
		same wing
_	0	Calculates cases with and without thickness effects
DA(50)	1	Calculates case without thickness effects only
	2	Calculates case with thickness effects only
K M N	≤DA(28)	Counter of the modes of deflection
DA (28)	≤ MD	Total number of modes to be considered



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;Figure 1. - Flow chart of program SBOXR.

FUNCTION OF SUBROUTINES

A brief description of the function of each subroutine is given in this section. Some equations are noted here for the purpose of identifying the steps in the sequence of obtaining the final results, i.e., the generalized aerodynamic force coefficients. It is suggested to refer to reference 1 for the derivations of these equations. The freestream flow is in the positive x direction and the apex of wing is at the origin. The spanwise direction is designated by y. Since the plane passing through the centerline chord and perpendicular to the wing planform is the plane of symmetry of wing geometry and motion, the input of wing geometry, deflection, and steady-flow Mach number distribution needs to be made only for the portion of the wing where $x \ge 0$ and $y \ge 0$ (see figure 3). It is assumed that the camber, twist, and mean angle of attack of the wing are all small; and the difference in local Mach number at the corresponding points of the upper and lower wing surfaces can be neglected. As the computer program is presently formulated, the motion is limited to symmetric modes. This limitation is imposed by the expression used in the present program to evaluate the influence coefficient of upwash due to a unit doublet distribution.

In the following, the variable name used in the computer program to represent a certain quantity mentioned in the description of a subroutine is indicated in the parentheses following such quantity, also, whenever a variable NEW appears as a subscript to another variable it is implied that the operation is applicable to either physical (NEW=1, without thickness effect) or transformed (NEW=2, with thickness effect) wings.

SBOXR - a controlling routine; also performs the final calculation of the generalized aerodynamic force coefficient for the full wing as given in equation (12), and prints out the results.

DATRD - data input routine; for a new wing, the data array (DA(k)) is cleared every time but for the same wing, the old value is used if a new value is not entered (blank datum will not affect the old value). SHAPE - wing geometry routine; the main objectives of this routine are as follows:

- approximates the wing planform of the physical or tranformed wing with
 a grid of square boxes and calculates the number of boxes (ML(NEW, i.))
- along each spanwise column (XX(i))
- (2) finds the number sequence of the leading (MLT(NEW,1,j)) and trailing edge (MLT(NEW,2,j)) wing boxes along each chordwise row (YY(j))
- (3) finds the number sequence of the first (MLC(NEW,1,i)) and the last (MLC(NEW,2,i)) wing boxes along each spanwise column (XX(i))
- (4) computes the wing tip adjustment term (EDG(NEW,i)) along each spanwise column (XX(i))
- (5) finds the Mach number at each wing box center on the physical wing (AMA(j,i,1)) and at those points on the physical wing corresponding to the box centers (AMA(j,i,2)) and the trailing edge (XTE(NEW,j), CTE(j)) along the chordwise row (YY(j)) of the transformed wing
- (6) redistributes the number of leading edge (XEDG(k), YEDG(k)) and trailing edge (XTDG(k), YTDG(k)) segments by subdividing the corresponding input data (XEDGI(k), YEDGI(k) and XTDGI(k), YTDGI(k)) for the physical wing so that the transformed wing can be better approximated
- (7) performs the coordinate transformation of the wing with thickness effect with the aid of the known Mach number distribution (SFMX(k), SFMY(k), SFMH(k), KSFM) on the physical wing, using the relations shown in equation (3); and also checks the possible creation of an artificial wake in the transformed wing resulting from an uneven distortion of the wing tip

PLNFM - wing geometry routine called from subroutine SHAPE; the main functions of this routine are as follows:

- (1) computes actual wing area in each box (AR(j,i,NEW))
- (2) computes the x-coordinates of the wing leading edge (XLE(NEW,j)) and, trailing edge (XTE(NEW,j)) along each chordwise row (YY(j))
- (3) calculates the full wing planform area (AREA) of the physical wing

- (4) finds the total number of boxes (ML(NEW,i)), including the wing as well as the wake along each spanwise column (XX(i))
- (5) finds the number sequence of the first (MLC(NEW,1,i)) and the last (MLC(NEW,2,i)) wing boxes along each spanwise column (XX(i)) in which the actual wing planform occupies at least 50% of the box area.
- (6) identifies, along each spanwise column (XX(i)), the number sequence of the first wake box (MLW(NEW,i)) of the wing-tip wake (MLW(NEW,i)<0) and the last wake box of the wing-root wake (MLW(NEW,i)>0)

POT2 - evaluates the integral in the expression relating the downwash and the velocity potential (equation (6)). The integral in equation (6) is integrated over the surface of each box $B_{i'j'}$ centered at $(x_{i'}, y_{j'})$ once for every frequency, and the result (A(N, j, i)) is used in the calculation of the velocity potential (S(N, j, i)) in both physical and transformed spaces for all modes under consideration at the same frequency.

DRED - fits the wing deflection for each mode (M) of motion in both physical and transformed space (SFDX(&,M), SFDY(&,M,NEW), SFDH(&,M,NEW), KSFD(M)) with a spline-surface of the form shown in equation (15) expressed in terms of the dimensionless coordinates. For the physical wing, the wing deflection in each mode can be given as input either in the form of the coefficients (SFDH(ℓ ,M,1)) of an expression H = $a_0 + a_1 \bar{x}$ (KSFD(M)=0) or deflection (SFDH(L,M,1)) at a number of predetermined points (SFDX(L,M), SFDY(L,M,1), KSFD(M)>0). For the transformed wing, the wing deflection in a particular mode is obtained either directly from the input data points for the physical wing (KSFD(M)>0) or indirectly from a number of selected points (KSFD(M)>0) on the physical wing of known deflection of form $h = a_0 + a_1 x$. The deflection (SFDH(l,M,NEW)) and the chordwise coordinate (SFDX(l,M)) of a point on the transformed wing are unaltered from those of the corresponding point on the physical wing, but its spanwise coordinate (SFDY(L,M,NEW)) in the transformed space is modified by a factor of the Mach number (SFMX(k), SFMY(k), SFMH(k), KSFM) from that of the physical wing (see equations (3) and (8)).

SLCT - called from subroutine DRED; selects a maximum of NB number of

points from the input data on the physical (NEW=1) or transformed (NEW=2) wing for the spline-surface fitting of the wing deflection.

WVAL - calculates the complex (real N=1, imaginary N=2) downwash (S(N,j,i,)) at the center of each box (ij-th) for a particular mode (M) and reduced frequency (CK) using the known wing deflection spline-surface (SFDX(L,M), SFDY(L, M,NEW), SFDH(L,M,NEW), KSFD(M)) for the planar wing in physical (NEW=1) or transformed (NEW=2) space.

BOXP - incorporates the leading edge adjustment, equation (9), to the computed velocity potential (S(N,j,i)); computes pressure coefficient, equation (11), when a print out of its value is desired. To compute the pressure coefficient for the wing with thickness, the velocity potential on the physical wing is found by transforming the known velocity potential on the transformed wing with the known coordinates and Mach number on the physical wing.

BOXPO - called from subroutine BOXP, solves a set of simultaneous equations, equation (6), relating the complex velocity potential (S(N,j,i)) and the known complex downwash of a particular mode (M) at the center of each box (ij-th) to obtain the velocity potential of the zero thickness wing in the physical and the transformed spaces. Since the disturbance is considered not to travel upstream, the calculation is carried out for one spanwise column at a time starting from the most forward column. The number of upstream columns influencing a particular column is controlled through the input (DA(49)). If a wake is encountered, the velocity potential in the wake along a chordwise row (YY(j)) is computed using equation (5) for various chordwise stations; the velocity potential at the trailing edge (XTE(NEW,j)) is interpolated from the velocity potential computed for the last wing box and the first wake box along the same chordwise row by considering the first wake box to be a wing box.

FORCI - performs the integration of the generalized aerodynamic force coefficient, equation (12a) or (12b), according to whether the wing is in the physical or transformed space. At each box center on the wing, the values of f and f_X as required in equation (13) are obtained from the fitted splinesurface, equation (15) and φ_0 is known. For wing with thickness, the Mach

number at each box center on the transformed wing (eq. (13b)) is interpolated from the spline-surface representing Mach number distribution on the physical wing. The integration in x-direction along each chordwise row (YY(j)) is carried out by computing the value of the integrand at a number of points along a particular row and then completing the integration with the quadrature expression shown in equation (16). The integration in y-direction is accomplished in the same manner. For the wing with thickness effect, the procedure of evaluating the integral is the same except the involvement of the Mach number at those points on the physical wing corresponding to the box centers (AMA(j,i,2)) and trailing edge (CTE(j)) on the transformed wing.

MRED - fits the mean steady-state Mach number distribution (SFMX(k), SFMY(k), SFMH(k), KSFM) over the physical wing with a spline-surface, equation (15), expressed in terms of the dimensionless coordinates. The input for the Mach number can be either in the form of the coefficients of an expression Mach number $\approx a_0 + a_1 \bar{x}$ (KSFM=0), or as tabulation (SFMH(k)) of the Mach number, or the pressure coefficient at a number of predetermined points (SFMX(k), SFMY(k), KSFM>0) on the physical wing.

INTGL - called from subroutine FORCI; carries out the evaluation of the integral in equation (13) by, first, fitting the values of the integrand at a set of predetermined points with a cubic spline, equation (14), and then by using the following quadrature expression:

$$1 = \frac{1}{2} \sum_{j=2}^{N} d_{j} \left[-\frac{1}{12} d_{j}^{2} \left(M_{j-1} + M_{j} \right) + \left(H_{j-1} - H_{j} \right) \right].$$
(16)

Equation (16) sums the sectionally integrated area under a cubic spline (equation (14)); which fits N values of the integrand, between two adjacent points, j-1 and j.

TRIDI - called from subroutine INTGL; solves for the roots of a set of equations whose coefficient matrix is a tri-diagonal matrix.

SPLN1 - provides a cubic-spline fit for a variable at a given set of

points, from which the interpolated values of the dependent variable and its derivative may be obtained using subroutine SPLN2; also inserts an additional point between every successive pair of input points in the original set to increase the number of points for cubic-spline fitting and performs the specified number of smoothing iterations using subroutine SMOOTH.

SPLN2 - called from subroutine SPLN1; interpolates the value of the dependent variable and calculates its derivative at the set of desired locations.

SPISET - called from subroutine SPLN1; computes the slope of the dependent variable using the cubic spline method at those points where the values of the dependent variable are known.

SMOOTH - called from subroutine SPLN1; replaces the value of the dependent variable at each of the predetermined points with the new value computed by passing through a five-point least-squares cubic before the slope at these points is computed.

CHLSKY - called from subroutine SMOOTH; solves for the roots of a set of simultaneous equations whose coefficient matrix is a symmetric matrix.

SURF1 - spline-surface fitting routine; with the known values of the dependent variable at a number of points of known coordinates, this routine finds the coefficients of the spline-surface associated with those known points of the form shown in equation (15).

SURF2 - interpolating routine; finds the value of the dependent variable and its partial derivatives at a specified point based on the fitted splinesurface.

CIN - calculates sine and cosine integrals.

MSIMER - finds solutions of the simultaneous real number equations. MSIMEC - finds solutions of the simultaneous complex number equations.

PROGRAM DIMENSIONS

The present computer program is dimensioned to handle a maximum of 30 (MB) boxes either in chordwise or spanwise direction in approximating one-half of the wing planform. The maximum numbers of leading and trailing edge segments are, respectively 7 (NEDGI-1) and 2 (NTDGI-1). It can handle up to 3 (MD) wing deflection mode shapes. The maximum number of points used in the spline-surface fitting is 100 (NB). These limitations can easily be increased by changing the dimensions of the corresponding variables in the computer program.

The maximum number of input points to describe the wing deflection and the thickness effect expressed in terms of the steady-state, either the Mach number distribution or pressure coefficient distribution is presently dimensioned 100 (NB). This number can be increased to 128 by activating the unused portion of the input data array, DA, from locations 501 to 700 and by changing the value of KP, the starting location for the thickness effect input points, from 701 to 613 in subroutine MRED and the value of NB from 100 to 128 in program SBOXR. The dimensions of the variables used in the spline-surface fitting need to be changed according to the new value of NB.

RESULTS

Sample calculations were made using the present program as well as other versions of sonic-box computer program. It was found necessary to use a unitbox increment instead of a multi-box increment in the convergence test due to the inherent property of the box method. Since no smoothing is applied to any computed values in the present program, the pressure coefficient calculated should be used with caution. In order to use it, one needs to put the pressure coefficient distribution through a smoothing process such as the built-in smoothing routine which was not utilized, however, for the results presented in this section. The pressure coefficient is obtained by differentiation of a set of numerical values whereas the generalized aerodynamic force coefficient is obtained by integration. Since integration itself is a smoothing process, the resulting generalized aerodynamic force coefficient is

considered to be acceptable within the bounds of the accuracy of the numerical techniques and the adequacy of the sonic-box method.

Wings considered in the sample calculations are delta, cropped delta, arrow and rectangular wings and are given separately below.

Aspect Ratio 1.5 Delta Wing

Zero Thickness. - Shown in figure 4 is the convergence with respect to the number of boxes along the root chord of the generalized force coefficients due to plunge (mode 1) and pitch about its apex (mode 2) at a reduced frequency 0.2 for an aspect ratio 1.5 delta wing. The results obtained from the present and the other sonic-box computer programs given in references 1 and 2 are plotted in the same figure for comparison. The program of reference 3 generated the same results as that of reference 1. The results of the present program appear to show more clearly the converging trend at a fewer number of boxes used in the computation than the other sonic-box programs.

The computed and the smoothed velocity potentials along a chordwise row, y = 0.0166667 from root chord, of the aspect ratio 1.5 delta wing due to plunge at a reduced frequency 0.2 from reference 3 using 30 boxes along the root chord are plotted in figure 5. The results from the programs of references 1 and 2 show the similar pattern of velocity potential distribution. In these programs, a smoothing of the computed velocity potential distribution is applied to obtain the distribution for the subsequent computation of the pressure and force coefficients. The velocity potential distribution over the same wing at the same conditions using the present program is shown in figure 6. In the present illustration, no smoothing is used; thus, the velocity potentials used in the computation differ from the computed values only near the leading edge where the leading edge adjustment is applied.

<u>Nonzero Thickness</u>. - Figure 7 shows the variation of the force coefficients due to plunge (mode 1) and pitch about its apex (mode 2) as function of the reduced frequency for the aspect ratio 1.5 delta wing computed with

the present program using 30 boxes along the root chord. The results with thickness were calculated with the assumption that the wing has an elliptic cross-section in a plane perpendicular to the chordwise axis and the steady-state pressure coefficient distribution used as input was obtained from the method given in reference 9. The distribution of Mach number at the box centers interpolated from the fitted spline-surface is plotted in figure 8. The Mach number distribution in spanwise direction for this wing is supposed to be constant but the interpolated value has deteriorated near the trailing edge. Since the error in magnitude is not large, the effect on the integrated results shown in figure 7 may not be very serious. As it was observed in reference 4, the present results also show that the thickness effect on the force coefficients of a delta wing is not very large. However, the effect on flutter speed can be significant (ref. 10).

Aspect Ratio 2.0 and 4.0 Delta Wings with Zero Thickness

Convergence of the force coefficient due to pitch, $f = -0.00617 + 0.017446 \tilde{x}$ (b = 0.5 ft.), of aspect ratio 2.0 delta wing at a reduced frequency 0.106 is shown in figure 9 and that due to plunge (mode 1) and pitch about its apex (mode 2) of aspect ratio 4.0 delta wing at a reduced frequency 0.1 is shown in figure 10. In figure 9, the present results are compared with that given in reference 5. The results of references 1 and 3 are included in figure 10 for comparison. According to the calculations performed for the delta wings, the results of the present program show a better and faster converging trend than that of the other versions of the sonic-box method computer program.

The computed velocity potential distribution without smoothing, due to plunge (f = 1.0) at a reduced frequency 0.1 of aspect ratio 4.0 delta wing from the program of reference 1 is plotted in figure 11, and that from the present program is plotted in figure 12. The numerical values of these two sets of results are not very different. The fluctuation of the values of velocity potential along the chordwise row as observed in figure 5 is not observed in figure 11. This is due to the difference in the box arrangement along the swept leading edge of the delta wings. The convergence plots of the force coefficients of a delta wing as function of the number of boxes along the root chord always show fluctuations; it does not increas or decrease monotonically toward the converged values. This is an inherent property of the box-method.

As shown in figure 13, the box arrangement along the swept leading edges can only approximate that of the actual wing. The number of boxes in a spanwise column does not increase uniformly from the nose to the tail of the delta wing. For example, the aspect ratio 1.5 delta wing has 3 spanwise columns with the same number of boxes, followed by another 3 columns with the same number of boxes and followed by 2 columns with the same number of boxes and this sequence, 3-3-2, is repeated toward the trailing edge of the wing. For the aspect ratio 2.0 and 4.0 delta wings, the sequences are, respectively, 2-2 and 1-1.

From the plots shown in figure 5, one notices that the fluctuations of the computed velocity potential along a chordwise row is caused by the sequence of increase of the number of boxes in the spanwise columns from the nose toward the tail of the wing. The plots in figure 5 clearly show that the values of the computed velocity potential along a chordwise row increase whenever the number of boxes in a spanwise column increases and remains the same or decreases whenever the number of boxes remains unchanged. This is the way the fluctuation is formed.

The fluctuation of the computed velocity potential along the chordwise row of the aspect ratio 4.0 delta wing is not observed. This is due to the fact that the number of boxes in the spanwise column increases by one uniformly from the leading edge to the trailing edge, and the magnitude of the computed velocity potential only increases in value.

The fluctuation of the force coefficient as function of the number of boxes along the root chord shown in figure 9 is probably caused by the number of boxes in the spanwise column at the trailing edge of the aspect ratio 2.0 delta wing. The box number sequence for this wing is 2-2 and the last spanwise column may end at the middle or end of the sequence depending on whether an even or an odd number of boxes along the root chord is chosen. The example shown in figure 5 ends at the middle of the sequence.

The similar data from the present program are shown in figures 6 and 12. Except for the leading edge adjustment, the results presented in these figures are the computed values unsmoothed. The fluctuation of the computed velocity potential along the chordwise row is greatly reduced. This is achieved by including the contributions from the partial boxes along the leading edges.

Cropped Delta Wing with Zero Thickness

Shown in figure 14 is the convergence of the force coefficients due to plunge (mode 1), f = 1.0, and pitch (mode 2), $f = -0.4034 + 1.832 \ \bar{x}$, (b = 0.5833 ft.), at reduced frequency 0.095 with respect to the number of boxes along the root chord of the aspect ratio 1.5 cropped delta wing with taper ratio 0.143. The results computed from the programs of references 1 and 2 are also included for comparison. It is again observed that the results of the present program show a better converging trend than the other versions of the sonic-box computer program.

Arrow Wing with Zero Thickness

The convergence of the force coefficients due to plunge (mode 1) and pitch about its apex (mode 2) at a reduced frequency 0.5 of a pointed tip wing with aspect ratio 4.0 and leading edge sweep angle 56.33 degrees is shown in figure 15. The results computed from the present program and that of reference 2 are included in the figure. The convergence rate as well as the converged values of these two programs are about the same.

Distributions of the velocity potential due to plunge on the wing and in the wake calculated from the present program and that of reference 2 are, respectively plotted in figures 16 and 17. The reduced frequency is 0.5 and the number of boxes used in the chordwise direction is 30. The leading edge adjustment is included in the results shown in figure 16, but no smoothing. The results computed from the program in reference 2 shown in figure 17 are

the smoothed values and the computed values along 1st, 5th, 10th and 15th chordwise rows. These computed velocity potentials exhibit the similar fluctuation in the chordwise direction as observed in the case of delta wing.

_ The velocity potential at the trailing edge of the arrow wing is interpolated from the velocity potentials computed at the centers of the last wing box and the first wake box along the same chordwise row. This wake box is assumed to be a wing box in the preliminary computation to facilitate the evaluation of the velocity potential at the trailing edge; this box is treated as a wake box thereafter. In reference 2, the velocity potential in the wake along a chordwise row is computed from the velocity potential at the trailing edge of the wing on the same row before the smoothing is applied. After the smoothing, the velocity potential at the trailing edge may not remain the same as the one originally used in the computation of the velocity potential in the wake. This, in turn, raises the question of the correctness of the velocity potential in the wake which was used in the computation of the velocity potential on the portion of the wing downstream of the wake in question. The problem area of the computer program in reference 2 described here is depicted in figure 17. In the present program, this does not become a problem because the computed velocity potentials in the chordwise direction are fairly smooth and no additional smoothing is applied.

Rectangular Wing

Zero Thickness. - The results for a rectangular wing of aspect ratio 2.0 performing plunge (mode 1) and pitch about its leading edge (mode 2) at reduced frequency 0.6 are presented in figures 18, 19, and 20. In figure 18, the convergence of the different sonic-box programs is shown. The convergence of the present program again showed a better trend than the other versions of sonic-box method computer program. Since the calculations were made only up to 20 boxes along the root chord, the converged Values of the other programs were not yet attained. The difference in the values of force coefficients of the present method and that of reference 3 might have been due to the different data fitting techniques used in the programs. The different ways of treating the wing leading edge in these two programs do not have effect on the results for this wing because there is no partial box involved in the computation.

<u>Nonzero Thickness</u>. - The convergence of the present program and that of reference 3 for both zero and nonzero thickness is shown in figure 19. This rectangular wing has a biconvex airfoil section with a thickness ratio 0.0521 and the steady-state Mach number distribution on the wing was calculated with the method of reference 9. The thickness has greater effect on the rectangular wing than on the delta wing (fig. 7). This may be caused by the fact that the Mach number on the rectangular wing (fig. 21) deviates from unity more than that on the delta wing. For the nonzero thickness, in addition to the differences in data fitting technique and handling of wing leading edge, the method of computing the force coefficients is also different. In the present method, the force-coefficient integration is performed in the transformed space, whereas the method in reference 3 integrates in the physical space.

Variation of the force coefficients with respect to reduced frequency is plotted in figure 20. Both zero and nonzero thickness using the present program and that of reference 3 with 20 boxes along the root chord are shown. The results of reference 6 for the zero thickness wing are included in figures 20(c) and (d) for comparison. Agreement between the present results and that of reference 6 is better in the medium frequency range. This may be attributed to the different assumptions imposed on the parameters involving reduced frequency. The results of reference 6 are based on a theory for large values (greater than 0.8) of the product of aspect ratio and the square root of reduced frequency, whereas, the present program is based on the assumption of small values of the product of box-side length and reduced frequency. With the sonic-box method, one needs to use more boxes to represent the wing as the frequency increases.

REMARKS AND RECOMMENDATIONS

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A sonic-box method computer program using the concept of local linearization to account for the effects of wing thickness in unsteady sonic flow. is presented. This program uses a coordinate transformation to reduce the small perturbation, unsteady transonic velocity potential equation, which has variable coefficients, to a linear equation with constant coefficients and solves this boundary-value problem in the transformed space by the sonic-box method by regarding the mean local Mach number as a parameter.

Accuracy of this approach deteriorates when the variation of Mach number on the physical wing is large. In fact, the method fails when the lateral variation of Mach number becomes large enough to cause multivalued transformation which implies wing-surface fold-over in the transformed space. Moreover, difficulties can also occur when artifical "wakes" created by the transformation impinge upon downstream portion of the lifting surface. Specifically, these "wakes" exist if yM along leading edge (or tip) at a particular chordwise location is greater than that at another location further downstream. Existence of these artificial "wakes" causes no difficulty, however, unless a portion of the transformed wing further downstream protrudes into these "wakes". Therefore, the user of this program should examine the geometry of the transformed wing to determine if these conditions exist.

This program includes the contribution of the partial boxes along the wing leading edge in the calculation of velocity potential, thus, allows one to use a smaller number of boxes to represent the wing than other versions of sonic-box computer program do. The earlier polynomial-surface data-fitting technique has been replaced by the cubic spline and the spline-surface to improve the accuracy.

Since the box method itself is numerical in nature, the distribution of the calculated values is not always smooth, that is, some degree of data oscillation is unavoidable. This means that some smoothing of the computed data will be desirable not only because of the oscillation of the computed data but also because of the very nature of cubic spline and the splinesurface techniques. Even though a smoothing scheme has been included in the program, it was not utilized in the samples presented. The adequacy of this smoothing scheme has not been extensively tested and the differentiation of the computed values has been avoided in the calculation of generalized

aerodynamic force coefficients. It is quite possible to lose the desired feature of the interpolating surface after the smoothing unless a proper control of the smoothing process is employed.

In the program, the vibration mode shape and Mach number are represented by spline-surface. The accuracy of the interpolating surface can be affected by the choice of the data points used to generate it. To facilitate an assessment of the accuracy of the fitting technique, nonzero thickness and flexible modes were not emphasized. Instead, zero thickness and rigid body modes were studied more extensively in the samples presented. Emphasis was placed on the consistency of the converging trend with the present program. According to the results presented, the thickness effect on the rectangular wing is quite significant, as much as 30%, but smaller for the deita wing. This is attributed to the difference in the Mach number variation for the two wings.

Since the accuracy of the present program depends on the data-fitting techniques used in the program, it would be most desirable to modify or change the fitting scheme so that the flexible mode shape and the Mach number distribution can be better represented and interpolated during_the computation.

One method to accomplish this is to generate accurate spline-surface for Mach number and each mode shape from a separate program and use these as part of the input. Another method is to input Mach number and deflection of every mode at each box center on the physical wing without fitting the data with surfaces and use the cubic spline to facilitate the interpolation required during the computation. Either of these two methods undoubtly will increase the computation time, but the additional cost may be compensated with the use of a smaller number of boxes to represent the wing.

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Figure 2. - Shapes of leading edge.

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Figure 3. - Half wing geometry.



(a) Lift due to plunge.

Figure 4. - Convergence of force coefficients due to plunge and pitch for delta wing of aspect ratio 1.5 at k = 0.2. Zero thickness.



(b) Moment due to plunge.

Figure 4. - Continued.



(c) Lift due to pitch.

Figure 4. - Continued.



Figure 4. - Concluded.



Figure 5. - Velocity potential along chordwise row at y = 0.0166667 due to plunge for delta wing of aspect ratio 1.5 at k = 0.2 with 30 boxes along root chord. Zero thickness.



'a' Real part

Figure 6. – Velocity potential along chordwise rows due to plunge for delta wing of aspect ratio 1.5 at k = 0.2 with 30 boxes along root chord. Zero thickness.

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Figure 6. - Concluded.



(a) Lift due to plunge.

Figure 7. - Force coefficients due to plunge and pitch for delta wing of aspect ratio 1.5 with 30 boxes along root chord.



(b) Moment due to plunge.

Figure 7. - Continued.



(c) Lift dúe to pitch.

Figure 7. - Continued.



(d) Moment due to pitch.

Figure 7. - Concluded.



(a) Chordwise distribution.

Figure 8. - Interpolated Mach number for $\tau = 0.10$ delta wing of aspect ratio 1.5.



Figure 8. - Concluded.



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Figure 10. - Convergence of force coefficients due to plunge and pitch for delta wing of aspect ratio 4.0 at k=0.1. Zero thickness.

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Figure 11. - Velocity potential along chordwise rows due to plunge for delta wing of aspect ratio 4.0 at k=0.1 with 20 boxes along root chord -- reference 1. Zero thickness.

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(b) Imaginary part.

Figure 11. - Concluded.



(a) Real part.

Figure 12. - Velocity potential along chordwise rows due to plunge for delta wing of aspect ratio 4.0 at k = 0.1 with 20 boxes along root chord -- present method. Zero thickness.



(b) Imaginary part.

Figure 12. - Concluded.



Figure 13. - Box arrangement along swept leading edge of delta wing.

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Figure 14. - Convergence of force coefficients due to plunge (mode 1) and pitch (mode 2) for cropped delta wing of aspect ratio 1.5 and taper ratio 0.143 at k=0.095. Zero thickness.



Figure 15. - Convergence of force coefficients due to plunge (mode 1) and pitch (mode 2) for arrow wing of aspect ratio 4.0 and leading edge sweep angle 56.33 degrees at k = 0.5. Zero thickness.

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Figure 16. - Velocity potential along chordwise rows due to plunge for arrow wing of aspect ratio 4.0 and leading edge sweep angle 56.33 degrees at k = 0.5 -- present method. Zero thickness.



Figure 16. - Concluded.

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Figure 17. - Velocity potential along chordwise rows due to plunge for arrow wing of aspect ratio 4.0 and leading edge sweep angle 56.33 degrees at k = 0.5 -- reference 2. Zero thickness.

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Figure 17. - Concluded.

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Figure 18. - Convergence of force coefficients due to plunge (mode 1) and pitch (mode 2) for rectangular wing of aspect ratio 2.0 at k = 0.6. Zero thickness.

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Figure 19. - Convergence of force coefficients due to plunge (mode 1) and pitch (mode 2) for rectangular wing of aspect ratio 2.0 at k = 0.6.





⁻ 67



(a) Lift due to plunge. '

Figure 20. - Force coefficients due to plunge (mode 1) and pitch (mode 2) for rectangular wing of aspect ratio 2.0 with 20 boxes along root chord.





(b) Moment due to plunge.

Figure 20. - Continued.


Figure 20. - Continued.



Figure 20. - Concluded

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Figure 21. - Computed steady state (mean) Mach number on rectangular wing of aspect ratio 2.0 and thickness ratio 0.0521.





APPENDIX

COMPUTER PROGRAM

Input Guide

Data are input through the subroutine DATRD using the one dimensional array DA with a size of 1005. The allowable maximum number for some of the input data as indicated below may be changed if the dimension of the corresponding starage array and computational operations are also changed accordingly. Subroutine DATRD initializes DA(1) through DA(22) to blank, the weighting factors in $\mathbb{C}^{\perp}(104)$, DA(108),---,DA(500) to 1.0, and the remaining portion of the DA array to 2.0. Consequently, these are the default values. The layout of the array $\mathbb{C}^{\perp}(k)$ as it is presently used is as follows:

1-7: Title

- 8-12: Not used
- 13-19: Mode title
- 20-22: 'Not used
 - 23: Frequency, (cycle/sec)
 - 24: Overall length of wing in streamwise direction, (ft or meter)
 - 25: Speed of sound of the freestream, (ft/sec or meter/sec)
 - 26: (0) indicates the frequency is the first one for a new wing
 - (1) indicates the frequency is the additional one for the same wing
 - 27: Number of boxes in streamwise direction (maximum 30)
 - 28: Number of deflection modes (maximum 3)
 - 29: Number (m) of segments of leading edge per semispan to be given, excluding segment from origin to y_0 ($m_{max} = 7$)

30-44:. Coordinates of points on the leading edge, (ft or meter)

- (in sequence of $y_1, x_1, y_1, x_2, y_2, \dots, x_n, y_n$), $n_{max} = 7$
- ' 45: Number (n) of segments of trailing edge per semispan to be given, (default: unswept trailing edge), $n_{max} = 2$
- 46-48: Coordinates of points on the trailing edge, (ft or meter)

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(in sequence of x_0, y_1, x_1 for n=2,
```

or x_0 (only) for n=1,

no input for n=0;

last trailing edge point conincides with the last leading edge point and is set internally)

- 49: Number of boxes allowed for upstream influence (if this location is left blank or assigned a zero, it will assume DA(49)=DA(27) and in no case DA(49)>DA(27) is allowed)
- 50: (0) indicates to calculate cases with and without thickness effect
 - (1) indicates to calculate case without thickness effect only
 - (2) indicates to calculate case with thickness effect only
- 51: Indicator to suppress calculation of potential for a mode
 - (0) no suppression
 - (1) suppression
- 52-53: Coefficients of the deflection polynomial (in the sequence of a_0 and a_1)
- 54-70: Not used*
- 71-72: Coefficients of the Mach number distribution polynomial (in the sequence of a_0 and a_1)
- 73-95: Not used*
 - 96: Indicator of the type of wing thickness effect input
 - (1) pressure coefficient
 - (2) Mach number
 - 97: Number of points at which pressure coefficient or Mach number to be given
 - 98: Number of points on which deflections to be given
- 99-100: Not used*
- 101-500: Deflection data for a maximum of 100 points (in the sequence of x, y, deflection and weighting factor)
- 501-700: Not used**
- 701-1000: Pressure coefficient or Mach number data for a maximum of 100 points (in the sequence of x, y and pressure coefficient or Mach number)

The remaining part of DA array is used for the control of intermediate results print out. When the latter is desired, a non-zero positive integer

number should be entered at locations in the DA array corresponding to the information from one particular subroutine is needed.

CBA: for wing deflection (DRED) 1001: A=1, for NEW=1 B=1, for NEW=2 } spline-surface fitted results - coordinates of the selected points used in C=1spline-surface fitting BA: for wing upwash (WVAL) 1002: A=1, for NEW=1 B=1, for NEW=2 } upwash 1003: FEDCBA for velocity potential (BOXP and BOXPO) A=1, for NEW=1 B=1, for NEW=2 $\}$ velocity potential C=1, for NEW=1
D=1, for NEW=2
} influence coefficient and solution matrices E=1, for NEW=1
F=1, for NEW=2 1004: A: for Mach number (MRED) A≕1 - spline-surface fitted results DCBA: for wing shape (SHAPE and PLNFM) 1005: A=1, for NEW=1 } distributions of box, box area, leading and B=1, for NEW=2 ^f trailing edges - Mach number at box centers C=1, D=1, for NEW=2 - redistributed leading and trailing edge segments

The format of the input data card is (A1, A5, 16, 6A10, A8). The first field is for the control of clearing the data array, DA, for a new wing '(+) and the control to indicate the end of the set of data (-). The second field is the indicator for the type of data, either numeric (blank) or alphameric (ALPHA). The third field is the designator for the relative location in the data array of the first number to follow in the fourth field. If this field is left blank, or a zero is entered, the execution will be terminated. The fourth and fifth fields are for five consecutive input data each occupying 12 columns plus 8 blank columns at the end. All the fixed point numbers are

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right-adjusted and the decimal point for the floating point number must be included. If an input datum is left blank, no change at the storage location for that particular datum in the data array will occur unless the set of the input data is for a new wing.

Those storages currently not used in array DA marked with * are reserved for future improvement in the method used for the functional form of data input. Those marked with ** are reserved for the case where a large number of data input points for deflection or Mach number is required.

Sample Case

A typical data deck set-up and output for an aspect ratio 1.5 delta wing having an elliptic lateral cross-section with 10% thickness ratio performing plunge and pitch about its apex are given below.

Input

The input format is (A1, A5, 16, 6A10, A8).

- Card 1: title of the case under consideration.
- .Card 2: title of the first mode of deflection.
- Card 3: first frequency (cycle/sec), centerline chord length (ft), reference velocity (ft/sec).
- Card 4: number of boxes along the centerline chord, number of deflection modes, number of total leading edge segments of the wing.
- Card 5: spanwise coordinate (ft) of the first section of the leading edge, chordwise and spanwise coordinates (ft) of the next section (the sequence is y_0 , x_1 , y_1 -- e.g., see figure 3).

. Card 6: first mode of deflection f = 1.0

the " - " sign indicates the end of the group of data cards to be read at this stage.

Card 7: title of the second mode.

- Card 8: second mode of deflection f = 0.1x.
- Card 9: identification of the type of input regarding the wing thickness

effect (Mach number for this case), number of points on the wing this information to be given.

Cards 10 to 69:

chordwise and spanwise coordinates (ft) of a point on the wing, and the Mach number at this point.

the " - " sign on the last card indicates the end of the group of data cards to be read at this stage.

Cards 70 and 71:

additional frequencies for the same wing, one card is read in at one time.

Card 72: blank card to make an exit from the computer.

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The card images ie as follows:

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+ AL PHA	1ASPECT PATIO 1.	5 DELTA WIN	IG (TAU#0.10)		
ALPHA	13PLUNGE		• • • • • • • • • • • • • • • • • • • •		
	23 0.159154941	10.0	1000.0		
	27 30	10 0	3 75		
-	52 1-0	10.0	2013		
ALPHA	13PITCH ABOUT ROO	T LEADING E	DGE X±0.0		
	52 0.0	0.1			
	96 1	60		•	
	701 0.1		0.140232		
	704 0.3		9.135125		
	710 0.7		0.129943		
	713 0.9		0.128084	•	
	716 1,3		0.124980		
	719 1.7		0.122340		
	722 2.1		0.119963		
	728 2.5		0.115627		•
	731 3.3	•	0.113564		
	734 3.9		0.110510		
	737 4,5		2.107428		
	740 5.1		0.104243		
	743 5.7		0.100872		
	749 6.9		0.093179		
	752 7.5		0.088395		
	755 7.9		0.084697		
	758 8.3		0,080342	•	
	751 847		0.074970		
	767 9+1		0.063062		
	770 9.5		0.056823		
	773 9.7		0.047651		,
	776 9.9		029651		
	7,79 1.7	0.5	0.122340		
	/92 J.J	1.0	0 107629		
	788 5.7	1.0	0.100872		
	791 6.9	1.0	0.093129		•
	794 8.3	1.0	0.080345	•	
	797 9.5	1.2	0,056823		
	800 4,5	1.2	0.101420		
	806 7.5	5.0	0.088395		
	809 8.7	5.0	0.074970		
	812 9.7	2.0	0.047661	•	
	815 9.3	2.5	0.080342		
	810 Y•/	3.0	0.04/001		
	824 3.9	0.5	0.110510		
	827 5.1	0.5	104243		
	830 6.3	0.5	0.097215		
	833 7.5	0.5	:.088395	-	
	835 9 . 1	C.5	2.001025		
	857 947 867 51	0.5	2.104243		
•	845 6.3	1.5	C.C97215		
	848 7.9	1.5	0.084697		
	851 9.1	1.5	:.067825		
	854 9,9	1.5	2,029651		
	860 69	2.0	0.100012		
	863 9.5	2.5	1.156523		
	866 9,9	2.5	0.029651		
	869 8.3	3.0	2.030342	•	
	872 9.1	3.2	1.067825	*	
	8/5 9,5	3.5	0.050823		
	343 947 33 1 601540447	3.5	0.052621	1	
	ニコー ミョンフィンマリアやせく			*	

Output

```
ASPECT RATIO 1.5 DELTA WING (TAU=0.10)
           30 POXES ALONG ROOT CHOPP
                                                         ROOT CHORD LENGTH = 10,00 FT
           REDUCED FREQUENCY = .010
                                                         FPER STREAM VELOCITY = 1000.00 FT/SEC
           FREQUENCY = 1,592E+01 CYCLE/SEC
                 MODE NO. 1 PLUNGE
                 MODE NO. 2 PITCH AROUT ROOT LEADING EDGE X=0.0
           SENERALIZED FORCES (NO THICKNESS EFFECT)
     MODES
   PRES. DEFL. ' REAL PART
                                           IMAJ PART
                                                                    ABS. VALUE
                                                                                         PHASE ANGLE
· · 1 1 2.151125-06
                                          -2.42783F-12
                                                                  2.427A3E-02
                                                                                          -89,9949
   1 2 -1.591365-07
                                            -1.611595-02
                                                                    1.611595-02
                                                                                          -90.0006
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                                            -2.445365-02
                                                                   2.42800E+00
                                                                                         -179.4226
     5. S
                                            -1.81349E-02
                     -1.61162E+00
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                                                                                         -179,3553
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              *00F 10, 2
           GENERALIZED FORCES (WITH THICKNESS EFFECT)
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                                          +2.42779E-02
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                     -1.118142-05
                                     -1.61155E-02
                                                                   1.61156F-02
                                                                                         -90.0398
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                        PRES. DEFL. REAL PART
                                           THAG PAPT
                                                                   ABS. VALUE
                                                                                        PHASE ANGLE
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1+01169E+00

-179.4587

-179.3945

2 1 -2.427858+00 -2.293788+02

<u>2</u> <u>-1.61160E+00</u> -1.70333E+02



ASPECT RATIO 1.5 DELTA WING (TAU=0.10) 30 BOXES ALONG POOT CHORD ROOT CHORD LENGETH = 10.00 FT REDUCED FREQUENCY = .100 FREE STREAM VELOCITY = 1000.00 FT/SEC FREQUENCY = 1.592E+00 CYCLE/SEC MODE NO. 1 MODE NO. 2 GENERALIZED FORCES (NO THICKNESS EFFECT)

4001	Es 🔤 📜				
PRES.	DEFL.	REAL FART	IMAG PART	AB5. LALUE	PHASE ANGLE
1	1	3,639858-04	-2.42141E-01	2.42141E+01	-89,9139
1	s	1.200575-04	-1.69604F-01	1.60674E-01	-89,9572

GENERALIZED FORCES (NO THICKNESS FFFECT)

MOD PRES.	ES DEFL.	REAL PART	IMAS PAPT	ABS. VALUE	PHASE ANGLE
2	1	-2.425562+00	-2,45150E-01	2.437928+00	-174,2287
2		-1.60948E+00	-1,81928E-01	1.619725+00	-173.5544

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MODE NO. 2

GENERALIZED FORCES (WITH THICKNESS EFFECT)

PRES.	ES DEFL.	PEAL PART	INAG PART	ABS. VALUE	PHASE ANGLE
1	1	-1,05402E-03	-2.41737 <u>E-01</u>	2,417395-01	-90.2498
. 1	S	-8,92541F-04	-1.60300E-01	1.60302E+01	-90,3190

GENERALIZED FORCES (WITH THICKNESS EFFECT)

NOPE					
PRES.	DEFL.	REAL FART	IMAG PART	A65. VALUE	PHASE ANGLE
2	1	-2.422832+00	-2,30551E-01	2.43377E+00	-174.5642
2	2	-1.607455+00	-1.713705-01	1.616562+00	-173.9147

ASPECT PATIO 1.5 CELTA WING (TAU=0.10) POOT CHOPD LENGTH = 10.00 FT 30 BOXES ALONG POOT CHORD REDUCED FREDUENCY = .400 FREF STREAM VELOCITY = 1000.00 FT/SEC FREDUENCY = 6 366E+00 CYCLE/SFC MODE NO. 1 -

HODE NO. 2 •

SENERALIZED FORCES (NO THICKNESS EFFECT)

MODI	ES DEFL.	REAL PAPT	IMAG PART	ABS. VALUE	PHASE ANGLE
1	1	5.005506-05	-9 - 513806-01	9,51736E-01	-88,4332
1	?	1,9371 <u>25-0</u> 2	-6,284*2E-01	6,28740E-01	-88,2345

GENERALIZED FORCES (NO THICKNESS EFFECT)

MÖDES

PRES. MEFL	• SFAL PART	THAG PART	AUS. VALUE	PHASE ANGLE
5 j	-2.415205+00	-9,989/25-01	2,61373E+00	-157,5298
5 5	-1.600305+00	-7.440755-01	1,76483E+00	-155,0635

MODE NO. 1 NOCE NO. 2

SENEPALIZED FORCES (WITH THICKNESS EFFECT)

-

KODM	ES	•			
PRES.	DEFL.	SEAL PART	ТМДС РДР+	ABS. VALUE	PHASE ANGLE
1]	1.543476-02	-9.39705F-01	9,39893E+01	-89,0591
1	2	1.222885-02	-6,202955-01	0.20416E-01	-88,8706
				-	

GENERALIZED FORCES (AIT- THICKNESS EFFECT)

PRES.	EŚ DEFL.	APAL PART	1070 5721	ABS. VALUE	PHASE ANGLE
2	1	-2,394565+00	-9.61(25F=0)	2.58021E+C0	-158,1326
` ?	2	-1.5=626;+00	-7,175+25-01	1.74082F+00	-155,6578

Computer Program Listing

.

	PROURAM SBOXR(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)	SEOXR
	MAIN PROGRAM	SBOXR
-	HS=HAXIMUN NUPBER OF JOXES ALONG THE CENTERLINE CHORD ALLOWED	SBUXR
	IN DIMENSION STATEMENT	SBOXR
	MD=HAXINUN AUPEER OF NODES ALLOWED IN DIMENSION STATEMENT	S50XR
2	NB=HAXIMUN NUPBER OF BIXES ALLOWED FOR SPLINE FITTING	SBOXR
	<u>NM=NB+3 ALLUHED IN JIHENSION STATEMENT</u>	SBUXR
	COMMON XX1201, YY (30), XEDG1(8), YEDG1(8), XEDG(32), YEDG(32)	SBOXR
	1 SNS(2)+NST(2) +XTDGI(3)+YTDGI(3)+XTDG(12)+YTDG(12)	SBOXR
	2 • xLE(2,30), XTE(2,30), YMAX(2), EDG(2,30), AR(30,30,2)	SBEXR
	3 +SFMX(100)+SF4Y(100)+SFMH(103)+KSFM+T(103+104)+DA(1005)	SBOXR
	4	SBUXR
-	5JHAX(2)+JHAK(2)+CTE(30)+AHA(30,30+2)	280XR
-	AREFACK, D, JH, DI, TEDG, IN, L, MB, NEH, NM, NSMAX, NEDGI, NTDGI	SEOXR
	DINENSION A(2, 00,00), (2,30,30)	SBCXR
	1 \$\$FDX(100,3),\$FDY(100,3,2),\$FDH(103,3,2),K\$FD(3),G(3)	SBOXR
	2. <u>• AEDGT(0)•YEDGT(0)•</u> XTDGI(3)•YTDGT(3)	SBOXR
	DATA Z/1H /	SEGXR
	IR=5	SEGXR
-	IW=6	SBOXR
	NEDG1=8	SBOXE
	NTEGI=3	SBOXR
	H8=30	SEOXR
	HD=3	SBOXR
-	NSKAX=32	SBOXR
	NE = 100	SECXR
	HATCH ABOVE NUMBERS TO THE DEFINED DIMENSION IN STORAGE ARRAYS	SECKR
	PE=>U+I	SECXE
	RL=2580	SECXR
	NR=No+3	SEGXR
-	WR112(14,33)	SBOXR
	ALAY DATA FUR THE ACTIAL HING	SEOXA
100	LALL SAFE(SA)	SEUXR
	12 日本 オクロサーニー スイン イング・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	28C X 4
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	1F (JA(26)) 100-160-160	SAUAR
150	CALL SHAPF	SAPIE
	1F(NE1.=2.2) 63 TO 130	58872
	AC=0.0/AKEA	Sacke
160	LIM=NL(NERAL)	SARXE
	IF (LIC-88) 17C.170.650	SBOXE
170	4_IM2=2+M8	SBOXE
	NFLNS = DA(49)	SBOXE
	IF (NFLNS .= Q.O) NFLNS = L	SAUXS
	LPGT = HINOLL .NELNS)	SEDIA
	L1H1=24H8	SBOXA
	CALL POT2(LIMI+LIM2+LPOT+CK+D+A)	SBOXR
180	CONTINUE	SBUXE
		SBUAN
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		TE LEMIN, NE STESTI GB TO 105	DATRD	12
Ŧ		NEW VING IF COLURN 1 CANTAINS A. FLUS SIGN	DATRD	13 -
č		THITIAL TRATION OF DATA ARRAY	DATRD	14
-		00 101 · 1=23-1005	DATRD	15
	101	DATA(1)=0.0	BATRD	16
		00 102 4=1,22	DATRD	17
	102	DATA(I)=Z	DATRO	18
		D8 103 I=104,700,4	DATRD	19
	103	DATA(1)=1.0	DATRD	20
	105	CONTINUE	DATRO	21
		IF (ALP.EG.ATEST), GO TO 9	DATRD	22
-		IF (ALP-NE-DTEST) GO TO 8	DATRO	23
C		NUMERIC CARD	DATRD	_ <u>Z4</u>
	•	D0 3 I=1,e	DATRD	25
		DDR6U(I)=DR8U(I)	DATRU	
	3	CONTINUE	DATRU	21
		DECODE (60,990,CORBU) (ORBU(1),I=1,5)	UAIKU	28
		0C 5 I=1,5	DATRU	29
		1F(DR3U(1))4,6,4	DATED	
C		TEST FOR BLANK FILLD	DATES	32
	_6	IF(SIGN (1.C, DKEU(1)))),), 4	DATRO	
	4	JATA(IND)=DPBC(I)	DATED	24
	5		DATED	735
	-		DATED	36
C			DATED	· · 37
	4	おとうえい キャンダイン ション・ション オート・ション ション・ション・ション・ション・ション・ション・ション・ション・ション・ション・	DATED	3.8
	10		DATED	
	10	INDELAGE TELE IS INTERESTING TELE	DATED	40
c	11	A TURK IN CLUBN & CONTAINS A BINHS SIGN	DATRD	41
L	1:	w/TURN	DATRD	42
r	ر :	AND TE DATA LANDS	DATRO	43
Ľ	; 1		DATRD	44
			DATRO	45
		STUP	DATRD	46
c			DATRD	- 47
-	2	CONTINUE	DATRD	48
		n liz	DATED	49
		(In. 993) L+IN, ALP + 14 - + (5++0(1), I=1,7)	DATRD	5Ò
		h≤1T ¹ ([h,991)	DATRD	51
		51	DATRD	52
	34,	F3+MAT(5212.0)	DATED	53
	441	FORMATISON BAD DATA ON THIS CARE. JOB TERNINATED	DATRD	54
	4+3	FLAMAI(12HOCARD IMAGE=A1, 45, 16, 7410)	DATRD	55
	147	FONMATI///IN , LOX, 17HNJ MGRE DATA CARE/)	DATRO	56
	•	ENŐ	DATED	57

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3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	i - Shafete	
		5.34
	SHOP	
	17 S 16 B 17	
R SALEASTROUGHINGTANE SALESTROUGH IN TANDANG ALTARED STATUS	ANT SHAPE	
	THAN STRANG	at a to
	- SHAPE	
	211026	
LPRIN-IPRIN-LOODSHITE	Shape"	36
JAITE PRIMING	SHAPE	-15
IPRIN=EPOIN-IQO-JRITE-	SHAPE	
	share Share	34
IF (MENNED. 2) "GB-30 200	SHAPE	19
IEDGRO:	SHAPE	20
HS111-DA(29)	SHAPE	21
IF (NS(1)) 450,850,100	SHAPE	
100 IF1(0541)+a;0054105410542050 105 N255411941	SHAPE	23
	SHAPE	25
IF (DA(241) 855,855,110	SHAPE	26
110 00 115 T=1.85P	SHAPE	-27
XEDG(1)=DA(2*1+27)/DA(24)	SHAPE	28
117 1606(1)=0844*1+201/04(24) YEAE(1)=8.0 *	SHAPE Shape	27
NST(1)=DA(45)	SHAPE	31
IF (NST(1)) 871,125,130	SHAPE	32
125 X106(1)=1.0	SHAPE	. 33
NST(1)=1	SHAPE	34
60 10 141 130 (FENSTELL) 135,135,971	SHAPE	36
135 NSTP=NST41}	SHAPE	
DO 140 I=1.nSTP	SHAPE	36
Y105(1)=04(2*1+43)/04(24)	SHAPE	39
140 X106(1=0A12=3+44)/DA(24)	SMAPE	
41 H3166=1100	SMAPE	42
XIDGINSTPI=XECC(HSP)	SHAPE	43
YTDG(NSTP)=YEBG(NSP)	SHAPE	44
Y105(1)=0.0	SHAPE	45
	SHAPE	
	SHAPE	48
x786(1)=x186(1-1)	SHAPE	49
142 YT05(13=YTD641-1)	SHAPE	50
150 IF(MBS(ATD64654)=XED6(H5P)=YED6(H5P)=YED6(H5P)1=61=ERKK)	SMAPE	51
	STARE	
XEDGIIIJ=XEDGII	SHAPE	54
YEDGIEI-YEDGII	SHAPE	55
IFEL-GT-NIDEL) GO TO 160	SHAPE	- 56
	SHAPE	57
	JHRFE -	76
LOU LURFIRUE	Share Share	<u> </u>
C	SHAPE	61
C FOR MODIFIED WING	SHAPE	62
C COMPUTE MACH NUMBER DISTRIBUTION ON PHYSICAL MING	SHAPE	63
200 DN=0.	SHAPE	64
<u>90 210 K=132</u> DD 210 T=1.4R	SHAPE	
00 210 Jelans	SHAPE	67
210 ANA(J,1,K)=1.0	SHAPE	68
00 215 I=1+L	SHAPE	69
· · · · · · · · · · · · · · · · · · ·		

•		15406(1.1.1).E0.0) 60 10,215	SHAPE	. 7
		C-W-C4217_11	SULLE	
		CALL SHREPAXXCITAY.J.K.J.AMALL.I.J.AMALL.FR.SEM.SEM.SEM.SEM.	SNAPE	73
	215	CONTINUE	SHARE	74
		IF(JETE,EQ.0) 60 10 235	SHAPE	75
3		PRINT OUT MACH DISTRIBUTION	SHAPE	74
		WRITE(IN+60)	SHAPE	- 77
		00 230 I=1,L	SHAFE	78
_		IF(MLC41,1,1).EQ.0) GO TO 230	SHAPE	79
		JL=MLC(1,2,1)-MLC(1,1,1)+1	SHAPE	80
	_ ~_	IFt# +E0.01 G0 T0 230	SHAPE	\$1
		WRITE(IW,70) 1	SHAPE	82
		JLP=JL/6	SHAPE	83
		IF(#_~6*JLP.NE.O] JLP=JLP+I	SHAPE	84
·		K1=ALC(1,1,1)-1	SHAPE	85
			24445	96
			SHARE	
	226	лтада Шатасаты яст аста, «мле «1.,г.,зъз., гіщк., зі рз.'	SHAPE	00
	225	TRATISTICS AND A CONTRACT	SHAPE	90
ſ	230	CONTRACT	SHAPE	91
	235		SHAPE	
			SHAPE	93
		NSP=1.+DA(27)/2. + ERRR	SHAPE	- 94
		02=2.*0	SHAPE	95
Ē		DEFINE EDGES OF MODIFIED WING	SHAPE	96
		DO 240 1=2,NSP	SHAPE	97
		XEDG(1)*FLGAT(1-1)*D2	SHAPE	98
		IF(XEDG(1).GT.XEDGI(K)) K=K+1	SHAPE	99
		YEDG(1)=YEDG1(K-1)+(YEDG1(K)-YEDG1(K-1))+(XEDG(1)-XEDG1(K-1))/	SHAPE	100
	:	s (XEDGI(K)-XEDGI(K-1))	SHAPE	101
	240	CENTINUE	SHAPE	102
		IF(IFIX(DA(27))-2*(NSP-1)) 810,255,250	SHAPE	103
•	250	NSP=NSP+1	SHAPE	104
		NS1=NS(1)	SHAPE	105
		XEDG(NSP)=XEOGI(NS1)	SHAPE	106
<u></u>		YEDGINSP)=YEDGI(NSI)	SHAPE	107
	255	CONTINUE	SHAPE	108
<u> </u>			SHAPE	109
		K1=2	SHAPE	110
			SHAPE	
		N34793561	SHAPE	112
		60 200 L=49834	SHAPE	
	-		SHAPE	115
			SHADE	
			SHAPE	110
	• . •	ar (A - JUNNIEU - ACDULILI) - DU FU - LEU A - NETHER	SHAFE	117
	• •		SHAFE CHADE	110 110
	. 7 1		SHAPE	120
			SHAPE	121
			SHAPE	122
		>: CJ (x+1)=xECC(x)	SHAPE	121
	2-0	YE JU(x+1)=Ytu((K)	SHAPE	124
		NSP=NSP+1	SHAPE	125
		XEOG(N3)=XEUGI(1)	SHAPE	126
		YEGG(K3)=YEDGI(I)	SHAPE	127
		X2=X7+1	SHAPE	128
	2931	kiski+1	SHAPE	129
	300	CONTINUE	SHAPE	130
		IF (KRITE) 310,320,310	SHAPE	131
С		PRINT DUT LEAGING EDGES TO BE TRANSFORMED	SHAPE	132
	310		SHAPE	133
		WK11E41W9653	SHAPE	134
			SHAPE	135
		WKITELINGTUD KLORENS IEDG	SHAPE	136
		MK11211H92VJ (K9AEUG(K)9TEUG(K)9K=19HSP)	SHAPE	137
	320	LUNIINUC	JHAFE	136
		AFTRDPAULARAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	JUATE	T3A

C	SHAPE 140
C CHECK IF MODIFIED WING HAS A FOLD-OVER EDGE	SHAPE 141
C TRANSFORM Y-CCORDINATE	· SHAPE 142
DO 350 1+1,NSP	
YNP-0.	SHAPE 144
Y1+0.	SHAPE 145
3*1	SHAPE 146
TETTILI	SHAPE 147
JJU BALL JUNFZCAELLIJSTS19191919180000955FRX95FRT95FRH9K5FR9:	SUARE 140
151-12-72-71 Variation	544PF 150
IF ANL 26 TA YA C-YAD	SHAPE 151
15-17HD.GE.D.) 60 TO 335	SHAPE 152
TIL II-IFBOALD -	SHAPE 153
	SHAPE 154
Prostien.	SHAPE 155
	34676 177 CHARC 160
ATTENTED STREET BERT HER ADDS THAN I /S IN A DUT	3075 3075 150
(The ASSA ASSA ASSA ASSA ASSA ASSA ASSA AS	SHAPE 160
4CR648=390	SHAPE 161
TERTIFICAT FERROR, (TI J+13; J=1, IER)	SHAPE 162
335 IF LANSIT YEDGELLIGALLI.ERRRJ GO TO. 340	SHAPE 163
	SHAPE 164
	SHAPE 165
LITAR CENTRELIN VAVERCITA	SHAPE IOT
	SHAPE 169
The FEDGEL KETEDGEL J+EN	SHAPE 170
	SHAPE 171
	SHAPE 172
IF(KRITE) 360+370+360	<u>SHAPE 173</u>
C PRINT OUT LEADING EDGES OF TRANSFORMED WING	SHAPE 174
360 K1#2	
NGLICINTTUI ALTHENTALIENS NGLICINT, AND SV. YEDESYN, VEDESYN, V-1, NEDN	
370 CONTINUE	SHAPE 178
C	SHAPE 179
C READJUST THE POINT DISTRIBUTION TO DEFINE NS(2)	SHAPE 180
<u>K1=0</u>	SHAPE 181
ICHECK=0	SHAPE 182
	SHAPE 183
AND-ANAAAAAND ARDU (II) And-Anaaaaaaaa	201455 195 SUADE 195
164YEDG41)-YEC641-111 +00+423+440	SHAPE 186
C ACCEPT SMALL WAKE DEMIND TRANSFORMED WING LEADING EDGE AS	PART SHAPE 187
C BE HING, IF NOT HORE THAN 1/5 OF A BOX	SHAPE 188
400 I(1,1)=XEDG(1)	SHAPE 189
TtZ.J=YEDU(I)	SHAPE 190
$\frac{T(3,1)=\lambda E C G (1-1)}{C C C C C C C C C C C C C C C C C C C $	<u>SHAPE 191</u>
14491/=TEBU11-1/ T/F 11-N=0	SHAPE 192
11092/-ITC ISD=5	ZHABE 104 JUNE 143
IF(YMP-YE00(I)_0T_0.4*0H) 62 TC 805	SHAPE 195
IERPOR=400	SHAPE 196
MRITELIMALU, IEAKUKA(F(Jai)aJ=1aIEP)	SHAPE 197
YEDG(I) = YMP	SHAPE 198
420 18(1.04.15meux+1) ou Tu 430	SHAPE 199
168-16-1 66 TO 260	SHAPE 200
оц. (С. ттц. 630. [Снегк=]	STAFE 201 Shade 203
x1=x1+1	SHAPE 202
440 K#I-K1	SHAPE 204
XEDG(K)=xcCu(1)	SHAPE 205
YED3(*)=YF.3(1)	SHAPE 206
45C CONTINUE	SHAPE 207
18(4-5(2Ac.2(+)).0(.ckkx) 02 YU 800	5HAPE 208
	104

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	·		
-	60 NS(2)=K-1	SHAPE	210
	66 TO 480	SHAPE '	211
• •	70. HS(2)=K	SHAPE	212
_ 1	80 NSP=NS(2)	SHAPE	213
τ.	15/VJ17L1 400-405-490	SHAPE	215
Č_	PRINT OUT LEAGING EDGES OF TRANSFORMED HING	SHAPE	216
- 4	90 K1=3	SHAPE	217
	WRITE(IW,40) KI,NEW,NS(NEW),IEDG	SHAPE	218
•	WRITE(IW,50) (K,XEDG(K),YEDG(K),K=1,NSP)	SHAPE .	219
4	95 CONTINUE	SHAPE	220
<u>د</u>	TRATI INC EDGE TRANSEDRNATION	SHAPE	
č	TRATE ING EDGE TRATE GRAATION	SHAPE	223
-	NST(NEW)=NST(1)	SHAPE	224
	NSTP =NST(NEH)	SHAPE	225
-	CALL SURF2(XTDG,YTUG,1,NSTP,0,T(1,1),DH,DH,SFHX,SFHY,SFHH,KSFH,1)	SHAPE	226
-	DC 510 I=1.NSTP	SHAPE	227
ל		SHAPE	220
		SHAFE	227
<u> </u>	PRINI UUT TRAICING SUSTE UF IRANSFURTED SING	SHAFE	230
	NDITE(IN493) RENNOCK/SYNDCKS.K=1.NSTP}	SHAPE	232
	530 CONTINUE	SHAPE	233
	550 ¥1=YEDG(1)	SHAPE	234
	YMAX(NEW)=YEDG(MSP)	SHAPE	235
<u> </u>		SHAPE	236
	1F\\CW+CW+CV+CV VU 1U 707 APFA=A_A	SHAPE	238
├	XX(1)=DH	SHAPE	239
	AA(1)=DH	SHAPE	240
	D0 560 I=2,48	SHAPE	241
	YY(I)≠YY(I−1)+D	SHAPE	242
c :	NON YYJIJ#YXIT-TIAN	SHAPE	293
- <u>c</u>	CALCULATE PHYSICAL FULL HING AREA AND HL (NEW-I)	SHAPE	245
C	COMPUTE AND IDENTIFY BOX DISTRIBUTION ON THE WING PLANFORM	SHAPE	246
	65 CALL PLNFNIXEDG, YEDG, XTDG, YTDG, XX, YY, XLE, XTE, AR, AREA, D	SHAPE	247
	5, s1WsLsHLsHLsHLGHLUsHLUsHLUsHLUsHLUsHLUsHLUsHLUsHLUsHLUs	SHAPE	248
-	TE(M (NEWst)_GT_NB) GO TO 825	SHAPE	277
-c-		SHAPE	- 251
	JMAX(NEW)=0	SHAPE	252
	JNAK(NEW)=0	SHAPE	253
		SHAPE	
5	70 JNAX(NEW)=MAXC(JHAX(NEW).ML(NEW.I))	SHAPE	256
	JHX=JHAK(NEW)	SHAPE	- 257
C		SHAPĘ	258
С [–]	FIND URDER OF LEADING EDGE BOX AT J-TH CHORDNISE ROW	SHAPE	259
		SHAPE	200
	D0 620 J=1, JHA	SHAPE	262
	EDG(NEW,J)=0.C	SHAPE	-263
<u></u>	D0 620 K+1+2	SHAPE	264
6	ZV TLIKENSKJJ)*U Tl#1	SMAPE	265
	12=1	SHAPE	-200
	K1=0	SHAPE	268
	D0 655 J=1,JMX	SHAPE	269
6	30 IF(MLC(MEN+2+11)-GE-J) GO TO 632	SHAPE	270
	11=11+1 C0 10 430-	SHAPE	271
	32 HZ1=T1	SHAPE	- 272
ເັ	FIND ORDER OF TRAILING EDGE BOX AT J-TH CHORDWISE ROW	SHAPE	274
6	34 IF(12.GT.L) GC TO 638	SHAPE	275
	IF (NLC(MEH, 2, 12).GT.0) K1=1	SHAPE	276
	IF(K1.EQ.0) GC 10 635	SHAPE	277
	AF MELLERGZ912JOEWOVARUARLIAREOUJ GU IU 646	SHAPE	278
	35 HLS=FASS(HLW[HFH=12])	CHADE	- 770-
	35 MLS=IABS(NLW(NEW+12)) IF(NLW(NEW+12)-NE+0) 60 TO 636	SHAPE	279 280
	35 MLS=TABS(NLW(NEW+12)) IF(MLW(NEW+12)+NE+0) GO TO 636	SHAPE Shape	279 280

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	12=12+1	SHAPE	282
	K7=1	SHAPE	2#2.
	CO TO 424	CHASE-	241
		CHAOF	344
636	IF(MLS-3) 64496469636	SHAFE	204
638	IF1K2+LT-0) G0 T0 648	SHAPE	28,5
	15104-07059-1711 647-647-646	SHAPE	244
	IF UR HUNCHYLLY UNKYUTCHE		
642	12=12+K2	SHAPE _	287
	TEAT2 JE HA CO TO 634	SHAPE	28.6
		CHARE	250
		SIMPE	
-		SHAPE	745
	60 T0 652	SHAPE	291
	A 2-MM LIZACH, T2 LAM S	SHADE	292
044		CHASE	202
	GU 10 69Z	JHAFE	273
646	NZ2=I2-1	SHAPE	294
	60 TO 652	SHAPE	295
449		SHAPE	296
040		CHADE	203
652		SHAPE	291
	$H_T(NEW, 1, J) = KZ1$	SHAPE	298
	HI T(NFH-7-3)=N77	SHAPE	299
		SHADE	300
622	CUNITNUE	SHAFE	200
C		SHAFE	101
Č	FIND ORDER OF WING BOXES AT EACH I-TH SPANWISE COLUMN	SHAPE	302
-	06 670 Jala	SHAPE	303
		CHADE	
	11 8UP 48UC 43111 00430054005	SUAPE	307
662	NLC(NEW,1,I)=KLW(NEH,I)+l	SHAPE	.305
	IF (ML C(NEW, 2, 1), EQ.0) MLC(NEW, 1, 1)=0	SHAPE	306
	CO TO 670	SHAPE	307
		CHARC -	
- 66 4	MLC(NEW,2,1)=1A85(MLW(NEW,1))-1	SHALE	30.0
	MLC(NEW,1,1]=1	SHAPE	309
670	CONTINUE	SHAPE	310
~		SHAPE	311
		SHALL SHALL	
	IF(IRITE.EQ.0) GO TO 678	2HYNE	315
	WRITE(IN+65)	SHAPE	313
	TEINEL FO. 1) SPITE/IN.771	SHAPE	314
		SHADE	215
	1F(NEM_E3-2) HK1[E(1M078]	SHATE	2.2
	WRITE(IW)82)	SHAPE	310
	DC 572 J=1.JHX	SHAPE	317
	WETTERTY	SHAPE	318
012	**************************************	CUADE	210
	HRITE(IN-83)	JAAFE	21.7
	D0 674 J=1,L	SHAPE	320
5 674	WRITE(IN-85) J.HLC(NFM-1-J)+HLC(NFN-2-J)	SHAPE	321
	HOTTE ATH ACT I NI CANCH T. IT NI CANCH 2. IT MI HANEN. IT MI AND	SHÀPE	· ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
0/4	RETELETON JACCONCASTS JAACCONCASTS JACKANCHANTALAANAA		
	CONTINUE	CUADE	222
619		SHAPE	323
<u>C</u>		SHAPE SHAPE	323
C 618	IE (XEDG(NSP)_GT_1_) GO TO 865	SHAPE SHAPE SHAPE	323 324 325
<u>678</u> C	IF (XEDG(NSP).GT.1.) GO TO 865	SHAPE SHAPE SHAPE	323 324 325 326
<u> </u>	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680	SHAPE SHAPE SHAPE SHAPE	323 324 325 326
<u> </u>	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1	SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327
<u> </u>	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM)	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328
<u>678</u> C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328 329
678 C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328 329 330
680 680	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330
680	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328 329 330 331
678 C 680 C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF(ABS(DY).LE.ERRR) IEDG=1 IF(DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328 329 330 331 332
680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAY2=YMAX(NEW)	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 326 327 328 329 330 331 331 332 333
680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW)	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333
	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NÉW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)=YHAX(NEW) DO 720 J=1,JHX	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 - 332 333 334
	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)*YHAX(NEW) DG 720 J=1.JHX IF (IEDG) 710,715,710	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 - 332 334 334 335
<u> </u>	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW) DO 720 J=1.JMX IF (IEDG) 710,715,710 D IM FOLLOWING EXPRESSION IS ARBITRARY	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 336
680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NÉW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)=YMAX(NEW) DO 720 J=1,JMX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW-4)=SADT(VMAY2=YMA)=YMA(NEW)=011)	SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 336 336 337
680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)+YHAX(NEW) DO 720 J=1.JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW.J)=SQ3T((YHAX2-YY(J)+YY(J))/(D+(2.*YHAX(NEW)-D)))	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331
680 C C C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW) DO 720 J=1,JMX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF(EDG(NEW,J).GT.1.0) GO TO 715	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338
680 680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (OPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)=YMAX(NEW) DO 720 J=1,JMX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(REW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(2.=YMAX(NEW)-D))) IF (EDG)(NEW,J).GT.1.0) GO TO 715 GO TO 720	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339
680 	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)*YHAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ2T((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF (EDG(NEW,J)=GT.1.0) GO TO 715 GO TO 720	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 336 337 338 339 340
680 C C C 710 715	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW) DO 720 J=1,JMX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=1.0 COMPUTE	SHAPE	323 324 325 326 327 328 329 330 331 331 332 333 334 335 336 337 338 339 340
680 680 C C 710 715 720	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)=YMAX(NEW) DO 720 J=1,JMX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW,J)=1.0 EDG(NEW,J)=1.0	SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 334 335 336 337 338 339 340 341
678 C 680 C C 710 715 720 C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)*YHAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(REW,J)=SQ3T((YHAX2-YY(J)*YY(J))/(D+(2.*YHAX(NEW)-D))) IF (EDG(NEW,J)=GT.1.0) GO TO 715 GO TO 720 EDG(NEW,J)=1.0 CONTINUE	SHAPE SHAPE	323 324 325 326 327 328 329 330 331 334 335 334 335 336 337 338 339 340 341 342
680 C C C C C C C C C C C C C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ2T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG)(NEW,J)=GT.1.0) GO TO 715 GO TO 720 EDG(NEW,J)=1.0 CONTINUE IF (NEW.EQ.11 GGE TO 750-	SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 335 336 337 338 339 340 341 341 343
680 C 680 C 710 715 720 C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (OY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)=YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(Z.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(Z.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)=YY(J))/(D+(Z.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YY(J))/(D+(Z.+YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=YMAX(NEW)-D)) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2-YY(J)=SQ3T(YMAX2	SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 334 335 336 337 338 339 340 341 342 343
680 C 680 C 710 715 720 C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)*YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDS(NEW,J)=GT.1.0) GO TO 715 GO TO 720 EDG(NEW,J)=1.0 EDG(SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 334 335 336 340 341 342 343 344 342
680 C C C C C C C C C C C C C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)*YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ2T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF(EDS(NEW,SZ)=SUS(SUS(SUS(SUS(SUS(SUS(SUS(SUS(SUS(SUS	SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 335 336 337 338 339 340 341 342 343 344 345
680 C 680 C 710 715 720 C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)\$YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)*Y(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T((YMAX2-YY(J)*Y(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(2.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J)*Y(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,J)=SQ3T(YMAX2-YY(J))/(D*(Z.*YMAX(NEW)-D))) IF (EDG(NEW,	SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 334 335 336 340 341 342 343 343 343 343 343 345 345
678 C 680 C C 710 C 715 720 C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.O.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)+YMAX(NEW) DO 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=S42T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF (EDS(NEW,J)=GT.1.0) GO TO 715 GO TO 720 EDG(NEW,J)=1.0 CONFUTE Y-COORDINATE AND MACH NUMBER OF POINTS ON PHYSICAL WING AT TRAILING LOGE OF TRANSFORMED WING AT CONFUTE Y-COORDINATE SAR TRANSFORMED WING AT TRAILING LOGE OF TRANSFORMED WING AT CONFUTE Y-COORDINATE SAR TRANSFORMED WING AT CONFUTE Y-COORDINATE SAR TRANSFORMED WING AT TRAILING LOGE OF TRANSFORMED WING AT CONFUTE Y-COORDINATE SAR TRANSFORMED WING AT TRAILING LOGE OF TRANSFORMED WING AT TRAILING LOGE OF TRANSFORMED WING	SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 336 337 338 339 340 341 342 343 344 345 345 345 345
680 C C C C C C C C C C C C C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 COMPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)*YHAX(NEW) DG 720 J=1,JHX IF (IEDG) 710,715,710 D IN FRLLOWING EXPRESSION IS ARBITRARY EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(2.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*YY(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21((YHAX2-YY(J)*Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-Y(J))/(D*(Z.*YHAX(NEW)-D))) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-YHAX(NEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-D)) IF(EDG(NEW,J)=Sq21(YHAX(DEW)-	SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 335 335 335 336 337 338 339 340 341 345 345 345 345 345 345 345 345
680 C 680 C 710 710 715 720 C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSM) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 CONPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YHAX(NEW)+YMAX(NEW) DG 720 J=1.JHX IF (IEDG) 710,715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW.J)=SQ3T((YMAX2-YY(J)+YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW.J)=SQ3T((YMAX2-YY(J)+YY(J))/(D+(2.+YMAX(NEW)-D))) IF (EDG(NEW.J)=SQ3T(YMAX(NEW)) DD 745 J=1.JHX N1=MLT(NEW.1,J)	SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 343 345 346 345 346 347 348
678 C 680 C C 710 C 715 720 C C C C C C C	IF (XEDG(NSP).GT.1.) GO TO 865 IF (NEW.EQ.2) GC TO 680 NSM=NSP-1 DY=YEDG(NSP)-YEDG(NSH) CCNTINUE IF (ABS(DY).LE.ERRR) IEDG=1 IF (DY.LT.0.) GO TO 827 CONPUTE VALUES FOR LEADING EDGE CORRECTION YMAX2=YMAX(NEW)+YMAX(NEW) DO 720 J=1.JHX IF (IEDG) 710.715,710 D IN FRILOWING EXPRESSION IS ARBITRARY EDG(NEW.J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF(EDG(NEW.J)=SQ3T((YMAX2-YY(J)*YY(J))/(D*(2.*YMAX(NEW)-D))) IF(EDG(NEW.J)=1.0 CONFUTE Y-COORDINATE AND MACH NUMBER OF POINTS ON PHYSICAL WING AT TRAILING LDGE OF TRANSFORMED WING AT EOX CENTERS UF TRA	SHAPE SHAPE	323 324 325 326 327 328 329 330 331 332 334 335 336 337 336 337 340 341 342 343 344 345 346 347 348 349 348 349 348 348 348 348 348 348 348 348

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	DO 740 K=1,K2	SHAPE	351
		SHAPE	352
	ULL=U	· SHARE	373
			329
	4244411 TLK*CN*K51 V-VICIUCAJAD	SHATE	377
730	Y=Y+BF1	SHAPE	
	K3=K3+1	SHAPE	358
- <u> </u>	FIND MACH NUNBER AT X.Y ON PHYSICAL HING	SHAPE	359
-	CALL SURF2(X,Y,1,1,1,EH,DH,EHY,SFHX,SFHY,SFHH,KSFH,3)	SHAPE	360
	S1=YY(J)-Y+EH	SHAPE	361
	IF(ABS(S1).LE.ERRR) GO TO 735	SHAPE	362
	1F(K3.GT.100) GO TO 830	SHAPE	363
	DEL= S1/(EH+Y+EHY+1.E=20)	SHAPE	364
		SHAPE	365
. (35		SHAPE	- 300
740	174TA1	SHAPE	307
745		SHAPE	
750	CONTINUE	SHAPE	370
Č		SHAPE	371
790	CONTINUE	SHAPE	372
Č		SHAPE	373
	RETURN	SHAPE	374
C		2HAPE	- 375
800		SHAPE	376
	1(1)17××±06(K) 1(2)11-×±06(K)	SHAPE	3//
		SUAPE	370
	G0 TC 840	SHAPE	380
905	TERROR-EUS	SHAPE	381
	GC TE 840	SHAPE	382
810	1ExRUR=010	SHAPE	383
	T(1,1)=DA(27)	SHAPE	384
	T(2,1)=NSP	SHAPE	385
		SHAPE	386
16		SHAPE	387
3 e15	1084.8-012 CD TD Had	SHARE	388
820	1FR80F=320	SHAPE	390
,	T(1,1) = x E D G (N S P)	SHAPE	391
•	$T(2,L) = Y \in CG(NSP)$	SHAPE	392
	T(3,1)=NSP	SHAPE	393
]Ex=3	SHAPE	394
	6C T 240	SHAPE	395
825	Iter 1 = 225	SHAPE	396
		Shape	397
	1 (2 + 1)=r T (2 + 1) = m (N) = m (SHAPE	398
		24465	399
		SHARE	400
• •		SHAPE	4Q1 402
827	IENRCR=#27	SHAPE	402
	T(x,1) = YEOS(NOP)	SHAPE	404
	T(2,1) = YEUG(NSP)	SHAPE	405
	T (1 + 1) = * 5 P	SHAPE	406
	T(4.1)=NSM	SHAPE	407
	156 = 4	SHAPE	408
	SU T, H4J	SH4PE	409
831	1258057750 773 - 15-7	SHAPE	410
	1 (1 9 1) - 1 T (7 3) - 1	SHAPE	411
	1 x c 9 ± 7 = 3 T (3, 3) = 1	SHAPE	412
	T (+ + 1) = Y	3042 2042	414
	T (5 + 1) = (*	SHAPE	415
	T(c,,)=5%Y	SHAPE	416
	T(7,1)=J.C	SHAPC	417
	184=7	SHAPE	418
547	WFIT:(IH,20) 1E-KUN, (T([,1),1=1,1ER)	SHAPE	419
	2106	SHAPE	420

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550 IFR#19	SHAPE	·421
00 TJ 390	SHAPE	422
555 IPF=04 (SHAPE	423
GE, TO SAU	SHAPE	424
860 1PE=30	SHAPE	425
	SHAPE	426
565 K= -4ING(K, NS(1))	SHAPE	427
I#R=2#K+29	SHAPE	42.8
G TG 890	SHAPE	42.9
871 IPr=45	SHAPE	430
890 hRITE	SHAPE	431
<u>C</u> (TW _y 10) IPR	SHAPE	432
10 FORMAT(1H0,10X,17HSHAPE BAD DATA,15)	SHAPE	4 33
20 FORMAT(1H0,103,38HbAD NUNBER IN SHAPE NEAR STATEMENT NO.,15,	SHAPE	434
171 <u>H.,153,1P8E14.6</u>]	SHAPE	<u>+35</u>
40 FORMAT(/1H0,5X,3HNO.,IZ,43H REDISTRIBUTION OF WING LEADING EDGES,	SHAPE	436
1 NS(,11,4h) = ,12,7H, IEDG,3H = ,11)	SHAPE	437
45 FORMAT(/1H0,5x,25HWING TRAILING EDGES, NST(,11,4H) = ,12,	SHAPE	438
$5 \qquad 10h_{2} 1EDG = 9I13$	SHAPE	439
50 FCRMAT(416x,13,1P2E11,4)) .	SHAPE	440
60, FCRMAT(1H1, 5x, 47HLOCAL 'HACH NUHBER_DISTRIBUTION''BN_PHYSICAL WING/)	· SHAPE	
65 FORMAT(1H1)	SHAPE	442
70 FORMAT(1H0,5X VIZ,19H-TH SPANWISE COLUMN)	SHAPE	443
75 FORMAT(IHG,5X,IZ,17H-TH CHORDWISE ROW)	SHAPE	444
77 FORMAT(40X,13FPHYSICAL HING///)	SHAPE	<u>`445</u>
78 FORMAT(40X,16FTRANSFORMED HING///)	SHAPE	446
80 FERMAT(1H - 5X -6(2X - I3 - 1PE13 - 5))	SHAPE	447
82 FORMAT(15X,68+GRDER OF FIRST(LEADING) AND LAST(TRAILING) WING BOX	SHAPE	448
<u>1IN CHORDWISE RGH//20X,1HJ,3X,12HHLT(NEW,1,J),3X,12HHLT(NEW,2,J)/)</u>	SHAPE	. 449
83 FORMAT(///15x,62HORDER OF FIRST(ROOT) AND LAST(TIP) WING BOX IN SP	SHAPE	450
<u>1</u> ANHI <u>SE_COLUMN//20X,1HI,3X,12HHLC(NEN,1,1),3X,12HHLC(NEN,2,1)</u>	SHAPE	451
2	SHAPE -	÷52
65 FORMAT(16X,15,5X,15,3(10X,15))	SHAPE	453
86 FORMAT(20X,58HGAUSSIAN INTEGRATION POINTS IN CHORDWISE ROW - GX(NE	SHAPE	454
14, K, J) //)	SHAPE	, 455
87 FORMAT(///2GX,52HGAUSSIAN INTEGRATION POINTS IN SEMI-SPAN - GY(NEW	SHAPE	456
1,K)//J	SHAPE	457
88 FURHAT(///20x,60HSPANHISE COURDINATE (GYP) AND MACH NUMBER (GHP) A	SHAPE	458
ST GX125K,J3/77	SHAPE	459
89 FORMAT(1H 15x,3(2x,13,1PZE16.6)) /	SHAPE	460
	SHAPE	* 461
STUP	201001 C	

	SUEKJUTINE PLNEMIXEUG, YEDG, XTDG, YTUG, XX, YY, XLE, XTE, AR, AREA, D	PLNFH	2
	, IH, L, HE, HL, HLC, MLW, NEH, NS, NST, JRITE)	PLNFN	3
	1/1 NSI 1/4 XLDC(1),YLUG(1),XTDG(1),YYDG(1),XX(1),YY(1),AR(MB,MB+1)	PLNFH	<u>.</u> •
	1 .NS(1).NST(1),HL(2,1),HLC(2,2,1),HLH(2,1),XLE(2,1)	PLNFH	5
	7 (XTE(2))	PLNFH	6
	ATA - Sha / L. I - (/ 6 K 1/0.001/ .ERRZ/1.E-05/ .AWAK/0.5/	PLHEH	7
		PLNFH	8
		PLNFH	9
		PLHFH	10
		PLNEN	11
	$N_{2}P = N_{2}(s_{1}c_{1})$	PLNEM	12
	N517=N51(NEW)	PENEN	i3
	nt ic lelyme	PINEN	14
	PLC(NEW, 2, 1) = C	PINEN	15
	MLW(NE+,I)=C		16
	>L-(NEW,I)=XEEG(NSP)	DINEN	17
	XTY (NEW,I)=XEC(NSP)	PLAFA	10
	00 30 J=1,Me	PLNEN.	Ťo
30	$\Delta \mathbf{r} (\mathbf{J}, \mathbf{I}, \mathbf{N}_{c} \mathbf{H}) = 0 \cdot \mathbf{C}$	PLNEM	19
C		PLNEM	20
210	(k)=)	PLNEM	21
	K2=NST(NFW)	PLNFH	22
		PLNFH	23
		PLNFM	24
*		PLNEN	25
		PLNEM	26
•		PLNEM	27
	¥2#¥K	PINEN	28
	λε 2 = 5 = 0	PINEN	20
			30
	AREA=0.0	PLAFA DINEM	21
	LSNG=1.U		27
	JLT=1	PLAFA	
C		PLNPA	33
220) 03 530 I=1,L	PENER	37
	1 C H D = 0	PLNEM	. 35
	IFIN=0	PLNEH	36
	1EDZ=C	PLNEN	37
	<u>۸۱ = ۲۲ (۲۰۰۸) ۲۰۰۸ (۲۰۰۸) ۲۰۰۸ (۲۰۰۸) ۲۰۰۸ (۲۰۰۸) ۲۰۰۸</u>	PLNFM	38
	YL=YR	PLNEN	- 39
	X6 = XX {-I }+3H	PLNFM	40
		PLNFH	41
	SAF=0_0	PLNEM	42
	TE (SNUL) 275-230-230	PLNÊN	43
	1 (ASING) 223(23)(23)(23)(23)(23)(23)(23)(23)(23)(PLNEM	44
227		PLNEM	45
	$\frac{1}{2}$	PINEM	46
			47
230			40
	IF((1+1-GT-NS(NEW)) GU 15 420	FLNFN Divêw	- 1 0 4.0
	IF(K1+1-++0) GC TO +00		77
240) ICH0=0	runra	
-	IF(XR.GT.XE2) ICHQ=1	PENER	21
250) J=J+1	PLNFM	52
	JFIN=0	PLNFH	53
	Y=YY(J)+CH	PLNEH	54
	IF (ASNG) 252+256+256	PLNFH	55
252	<pre>/ IF(ABS(XTUC(1)-XTUG(NSTP)).GT.ERR2.UR.I.NE.L) GO TO 254</pre>	PLNEH	56
	1F(Y-DH.GT.YTCG(NSTP)) 68 18.530	PLNFM	57
	$TF(N+W_{\star}) = TEG(1)$	PLNFH	50
		PLNEM	59
		DINEN .	0.6
254	SCHTSUTTARIJ, ISNEHJ	PINEN	61
			62
256	AR(J∮I∮NEH}=O.C		62
258	CONTINUE		00
-	1F(YI.LI.Y) GC TO 230	PLNEM	04
	IF(A3NG) 205,270,273	PLNEH	65
265	ARIJ, I, NEHJ=(.C	PLNEH	66
	GO TO 259	PLNFM	67
270	CCNTINUE	PLNEM	68
2.0	AR(J.I.NEh)=1.C	PLNFN	69
-	SAM=SAN+AP(J, I, NEH)	PLNFH	70

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•			•
•	CL 7 250	PLNER	• 71
200			72
280	IF (T-TE+ x x 2 + CE+D) 60 10 290		72
	AR(J,J,NL,)=AR(J,I,NEW)+ASNG#(YL-Y+O)/O	PENER	73
	A Le Con	PLNER	74
	A T = A T	PLNFH	75
	IF (1CHC.NE.1) CO TO 310	PENEH 📑	76
	1F(3K) 284-285-285	PLNFA	.77
1 224	TEAST TE VER CE TI TOO	PERFR	78
204		PINEN	79
		DINCH	80
230	IF(TEZAUEAT) CC IU 323		9,
586	CUNTINUE .	CLACH DI VERH	01 01
	IF(XE1+GT+XE) CC TC 400	PLAFA	82
	1E32=2	PLNER	83
-		PLNEN	8,4
290	¥1=x2···	PENFA	85
	¥1=Y2	PLNEH	86
295	1607=0	PLNEH	87
2.75	TEATCHE NETTING TURNING	PLNEM	88
		PLNEM	89
		DI NEN	90
		DA MEM TH	101
310		C 6 75 7 11	71
315	1F(JK) 31/,316,316	7L8F8	42
316	1F(YR.GE.Y) GE TO 320	PLNEN	¥3.
	GC TO 318	PLNFN	94
317	IF(YR.LE.Y-E) GO TO 320	PLHF#	95
318	CONTINUE	PLNFA	- 96
	1F(1CH0.EQ.11) G0 T0 325	PENFH _	97
	TFIN=1	PENEN	98
	X2=XR	PLNFH	- 99
-	YZ=YK	PENER	100
	GO TO 339	PLNFH "	101
	JFIN=1	PLNFA	102
	IF(JK) 322+321+321	PLNEX	103
321	Y2+Y	PLNFH	104
	G0 T0 323	PLNFN	105
	¥2=¥-0	PLNEN	106
323	$X_{2} \times = 1 + (Y_{2} - Y_{1} + 1) / TNG$	PLNEN	107
	TE (ABS (Y2-YP) . CT. F292) CO TO 330	PLAF	108
	TEINEI	PLNFA	109
		PLNEN	110
		PLNEN	111
- `x 75		#1 SE 1	112
363			2142
			114
	YETTEL	PLACE MINCH	116
055	ARI JJJ,NEWJ * AR(JJL, REHJ+0.)*ASH6*12.* AR-A2*ALJ*172	FLMEN	
C		PLATH	114
τ.	······································	- 許加的時代。	111-
	IF(ABS(TNG).LT.ERRR) TNG=1.E-20	PLNFN	118
1331	CONTINUE	PLNFN	119
	IF(JK) 332,331,331	PLNFH	120
331	IF(J.LT.JLT) 60 TO 334	PLIFT	121
-	XF1=XET+1AA{TT1}-AET1\LUB	PLHFM	122
-	IF(XLT.GT.XE2.AND.ASNG.GT.0.0) G0 T0 334	PLNEN	123
	IF(YEDG(1).GT.0.0.AND.YY(JLT).LE.YL.AND.ASNG.GT.0.0) XLT=0.0	PLNF1 .	124
	IF(YY (JLT).GE.YTDG(NSTP)) XLT=XTDG(NSTP)	PLNFN	125
	IF (ASNG.GT. O. C) XLEENEH. JLT **XLT	- PLNFH-	226
	(F(ASNG_LT.O.C) XTE(NEW,JLT)=XLT	PLNEN	127
	GC TO 333	PLNFN	128
- 337	IF(J.GT_JLT) GO TO 334	PLNEN	129
	XLT=XE1+iYY(JLT)-YE1)/THG	PLNFM	130
	TE(YY(J) T).GE.YTDG(NSTP)) XI T=XTDG(NSTP)	PLNEN	131
	XTENEN, HISTIT	PINEN	192
·. 225		DI HEH	
. 333	_ ቀችራቸ ማትራቸ የለቻቸው,		1746
			138
r 334	CONTRACT.		124
_*		C LOLO	130
	TEATERT AND	76878 01654	120
	ART ARE USING A CONTRACT AND A CONTR		130
	IF EJK J 3974 3924392	PLBP T	13.2
342	CERTINDE"	PLAPA -	. 140

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95 ·

IF (JFIN.EQ.1) GO TO 250	PLNFN	141
	PLNEN	142
344 [F[]=]N=EU=1] UU (U 495 - 260 [E/JAN/EU=1] UU (U 495 -	PENFN BLUEN	143
370 IT (A166/ 323/300/300 355 IC / ICA II CO 10 474		199
	PENER	144
360 [F([FIN.E9.1] G0 T0 465	PLNEN	147
GO TO 500	PLNFM	-148
C	PLNFM	149
C LEADING EDGE AND TRAILING EDGE COMPUTATION	PLNEN	· 150
C	PLHFN	[°] 151 _e
400 IF(ASNG) 440,465,405	PLNFM	152
405 IF(JR) 430,410,410	PLNEH	153
	PLNFM	154
1F(AL+GE+M3F/ 00 10 420		122
	PLNEW	120
K=KI+JK	PENEM	158
XE2=XEDG(K)	T PINEN	159
YE2=YEDG(K)	PLNEM	160
GO TO 450	PLNEN	161
420 [F(JK-LT-0) GC TO 240	PLNFH	162
X×=-1	PLNEN	163
JLT=J	PLNFH	164
MLC(NEW,2,1)=C	PLNEH	165
	PLNFN	166
93U KZ=KZ+JK	PLNFM	167
	PLNEM	168
	PLNFM	169
		170
YE2=YEG(K)		172
60 TO 450	BLACH	
440 K2=K2+i	DINEN	174
XE1=XTDG(K2)	PENEN	175
YE1=YTDG(K2)	PLNEN	176
XE2=XTDG(K2+1)	PLNEN	177
YE2=YTDG(K2+1)	PLNFH	178
450 G=XE2-XE1	PLNEH	17.9
F=YEZ-YEI	PLNFH	180
	PLNFH	181
	PLNFM	182
	PLAFN	183
		10Ê
455 CONTINUE	PLAFA	105
I CHO=0	PINEM '	187
IF (XR.GT.XE2) ICHQ=1	PLNEN	188
IF(IEDZ.EQ.1) 68 TO 290	PLNEN	189
IF(IE62.EQ.2) GO TO 295	PLNEN	190
<u>60 T0 250</u>	PLNEN	191 [°]
ζ	PENFH	192
C NUMBER OF BUXES IN SPANNISE COLUMN	PLNFM	193
C HARE ITPE AND URDER OF HARE BUX	PLNFH	194
465 IF (45NC) 478-467-467	PLNEM	195
467 IF (JK) 476,469	PLATA	163
0=+LL 63+	PINER	108
IF(A°CJ,I,NEH)+LT+ERR2) JJ=1	PLNFM	199
HL (NEH, 1)=J-JJ	PLNFA	200
C	PLNFM	201
	PLNFH	20Z
EC 471 K=1,JJ	PLNFM	203
	PLNEN	204
ITIAKIN JIMEN JALI ANAKI 60 TO 472	PLNFH	205
	PLNFN	202
	PLNEM	207
472 MLC(NEW+2+1)=KK-1		208
473 CENTINUE		209
	E SERVER O	* * 4

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С	1	ADJUSTHENT OF FIRST BOX AT LEADING EDGE ALONG KR-TH CHORDWISE ROW	PLNFH	21-1
		KK=HLC(NEH,2,1)	PENEN	212
		IF(XX()).GE.XLE(NEW,KK)) GU TU 4/4	PLACA	714
		NLLLANCH9291/=NLLLANCH9291/=1 NN TO 473	PLNFH	215
	. 74	10 (8 415	PLNFR	216
C		CONTENSE	PLNFH	217
		GO TO 500	PLNES	21.8
	476	HLS=-1	PLINFI	219
		NL (NEH, IJ-NL (NEH, I-I)	PLNER	220
<u> </u>		K=ML(AtWal)		- 777
	478 3	60 10 400/ HIC-1	PLNFA	223
	110	K*1	PLAFN	224
	480	DB 490 JJ=1.K	PLNFN	225
	<u> </u>	1F (ALIJ, 1, NEW13 (41, 434) 44	PL R. A	226
	481	FF1285248(11, 1.000) - 58821 - 40368 30482	PLMA	227
¢				220
	462		TERT I	
C _			FLILFH	230
	483	AR(JJ ₅ I ₅ NEW)=C.O	FILMPR DI NEM	232
	484	LUNTINUE	PLNEN	233
		JF (ACH (NEH) 17 + NE + 07 00 10 490	PLNEN	234
С		WIG TIP HAKE	PLNFN	235
-	486	IF (AR (JJ, I, NEH).GE.AWAK) GO TO 490	PLNFN	236
		MLW(NEH,I)=JJ	PLNFN	237
		GO TO 488	PLNFM	238
C		NING RUDT WAKE	PLAT	239
	497	1 P(AK(JJ)19REH)+L1+AHAR/ GO /G 490	PLNFM	241
	488	HLW(NEW+I)=HLW(NEW+I)=HLS	PLNEM	242
·	490	CONTINUE	PLNFM	243
		60 TC 500	PLNFM	24.4
C			PLNFN	245
ç		TPAILING EDCE BUX AREA ADJUSTMENT FOR HING TIP MAKE		- 240
ι		CONTINUE -	PLNEM	248
	- ייי	1= 1- ;	PLNFH	249
		Y=Y-J	PLNFN	250
		JFIN=0	PLINFA	251
		SAM=SAM+An(J:1:1:NEH)	PLNEH	252
		GC TH 290	PLNEM	253
Ľ.			PINEM	255
r r		END OF A STANKISE COLONN	PLNFN	256
v	500	CONTINUE	PLNFN	257
		[F(ASNG.GT.U.) GO TU 516	PLNEN	258
C		ADJUST WING TIP BOX FOR WING ROOT WAKE	PLNFM	259
	·	JJ=M_(NEWs1)	PLNFA	260
	710	IFIANIJJ\$\$\$PENJ&LI&AMAN3 60 40 914 NJCINE4.2.13=11	PLNEM	262
			PENFH	263
	512	JJ=JJ+1	PLNEH	264
	_	IF(JJ) 514,514,510	PLNEN	265
	514	HLC(NEH,2,I)=C	PLNEN	266
		IF(MLW(NEN,I).EQ.0) GO IU 516	PL 827	207
		RF11211891333 1919868958913919986689696913	PLMEN	769
	516	CANTINUE	PLNEM	270
		SUH=SUH+SAH	PLNEH	271
C			PLNEN	272
	530	CONTINUE	PLNEN	273
<u>.</u>			PLNEN	2/4
		11 (A)NG 4L (404 CJ 60 10 700 1 (7)NG 4L (404 CJ 60 10 700	PL NEN	276
Ē		171X10011740E4X1001031733 00 10 700	PLNEN	277
č		INITIALIZATION FOR WING ROOT WAKE	PLNEN	278
Ċ	· · · ·		PLNFM	279
		K2=0	PLNEH	280

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YR=0_0	PLAFA	281
	PLNFM	282
XE2=XT0G(1)	PLNFM	283
YE2=YTDG(1)	PLNFH	284
X2=XE2	PLNFM	285
Y2=YE2	PLR+ 7	286
ASNG=-1.0	PLNEM	287
JLT=1	PENEN	288
60 TO 220	PLNEM	289
C ERROR MESSAGE	PLNEM	290
650 K = 450	PLNEM	291
A=G		102
2=72	PLNEN	243
WRITE(10,130) X,2,4	DINEN	277
2108	DINEN	295
	PINEH	297
	PENEM	208
12(1)(1)(2) (1)(1)(2)	PLNEN	299
	PINER	300
IFINER-CULI RELICINGOJ	PLNEH	301
ATTNERSEARCA REALEAANAAN RE SKATTEIN	PLNEH	302
LL FJV IFIJL ILEMI KNČELI I	PLNFH	303
シレーアレ (パニアライ) メー 11 ノッ	PLNEM	304
1570 - 15 5881 60 T - 210	PLNEN	305
	PLNEH	306
710 WRITE/IW.703 1	PLNEM	307
WEITH TW TV PIC(N++2+1)	PLNFM	308
$I = (M_1 + (N_2 + N_1)) - 71 - 32 - 32 - 72 - 72 - 72 - 72 - 72 - 72$	PLNEH	309
715 WEIT- (10-75) FIR(NEW-I)	PLNER	310
60 13 725	PLNEH	311
720 FRITE (TY FC) FLE (N. 4.1)	PLNFN	312
725 EG 74C JJ=1+N	PLNFH	313
74C $HRITE(IH, 85)$ (J,AR(J,I,NEH), J=JJ,JL,K)	PLNFN	314
750 CONTINUE	PLNFM	315
c	PLŃFH	316
JL=ML(NEw,L)	PLNFM	317
*RTTE(6)140)	PLNEN	318
wRITE(0,145) (J,XL≥(NEM,J),XTE(NEM,J), J=1,JL)	PLNFN	319
c	PENFR	320
SUH=2.+*SUH+02	PLNFM	321
WRITETIN, 93) AREA, SUM	PLNFN	322
760 RETURN	PLNFM	323
65 FCRHAT(1H1,2CX,37HNON-DIHENSIONAL BCX-AREA DISTRIBUTION)	PLNEN	324
66 FORMAT(1H+,57x,21H - (PHYSICAL WING)//)	PLNEH	325
67 FGRMAT(1H+,57x,21H - (TRANSFORMED WING)77)	PLNEH	326
70 FORMAT(//2X,12,19A-14 SPANHISE COLUMN/)	PLNFM	327
72 FCRHAT(12X,16HF1RST L.E. $BOX = 13,22H-TH BOX FROM WING ROUT)$	PLNEM	328
75 FURHATLIZX, INFFINST WARE BUX =, 13, 22H-TH BUX FRUM WING RUUI/)		
BO FURHAI(12X,16FLAS) WAKE BOX =,13,22H-TH BOX FRUM WING ROUT/	PENER	330
85 FURMAI(5X,5(1X,13,1PE11,4))		391
90 FURFATT//IDA, 20HVING AREA CALULAI2U FRUM		332
L 12A/2GRLEADING AND TRAILING EDGES *, IPEII. 4/	PLACA	333
2 IDAY CONSUMMATION OF AREA OF BUXES *AIPEILATI		- 337 - 336
96 FUKRAI(//IUA) 43HNEGAIIVE BUX AKEA EXCEDS ALLUNABLE LINII ()		337
1 · ITELL++117/10/4937AR(9/13914);1391799078677 -917611-49		330
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· · · · · · · · · · · · · · · · · · ·	01 NCH	330
THE PERMITTING THE STATEMENT AND AND ANALLING EDGE FOINTS AT EACH CHEMENT.	FLATA	337
se Row/13x+1HJ+6x+7HLEADING+8X+BHTRAILING/)		
<pre>se ROW/13X,1HJ,6X,7HLEADING,8X,8HTRAILING/) 145 FORMAT(10X,13,1P2E15.5) 165 FORMAT(10X,29HLEADING,8X,24HLEADING,9X,24HLEADI</pre>		241
<pre>se ROW/13X,1HJ,6X,7HLEADING,8X,8HTRAILING/) i45 FORMAT(10X,13,1P2E15.5) 150 FORMAT(1H0,4X,29HDRHNEGATIVE VALUE NEAR SN,14,2X,AZ,1PE11.4) 156 FORMAT(1H0,4X,25HDRDE2 OF UTNE TTO ONLY TO IOU-VU COMPUTE ANTI-</pre>	PLNFR PLNFR	341
<pre>se ROW/13x,1HJ,6x,7HLEADING,8X,8HTRAILING/) 145 FORMAT(10X,13,1P2E15.5) 150 FORMAT(1H0,4X,29HPLNFHNEGATIVE VALUE NEAR SN,14,2X,AZ,1PE11.4) 155 FORMAT(1H0,4X,25HORDER OF WING TIP BOX IN ,12,43H-TH SPANWISE COLUMN IS NOT PROPERTY DEFINED//</pre>	PLRFA PLNFA J PLNFA at MEM	341 342 743
SE ROW/13X,1HJ,6X,7HLEADING,8X,8HTRAILING/) 145 FORMAT(10X,13,1P2E15.5) 150 FORMAT(1H0,4X,29HPLNFHNEGATIVE VALUE NEAR SN,14,2X,AZ,1PE11.4) 155 FORMAT(1H0,4X,25HDRDFR OF WING TIP BOX IN ,12,43H-TH SPANWISE COLU 1MN IS NOT PROPERLY DEFINED//	PLNFH PLNFH PLNFH PLNFH	341 342 343

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	SUBROUTINE PDT2(H2+H0+N0+CK+D+A)	POT2	·. z.
<u>c</u>		POTZ	्र
<u> </u>	THE VELUCITY FIELD OF A UNIFORM DUDBLET DISTRIBUTION	7012 PNT2	
č	NEEDED AND STERED IN THE ARRAY A IN COMMON	POTZ	- 6
<u> </u>		POTZ	7
<u>c</u>	HOTHO CONTROL THE NUMBER OF VALUES CONFUTED	POT2	8
C	HAT THE DANCE OF THE SECOND SUBSCRIPT IN THE ADDAY."	-9012	10
<u>č</u>	DIMENSIONED AI2-M2.N2). BUT TREATED HERE AS AN ARRAY	POTZ	$-\mathbf{\tilde{n}}$
č	HITH THO SUBSCRIPTS	POT2	12
<u>с</u>		POTZ	-13
	DINENSION ALZOID	PU12	
	H=NO.	POT2	16
·····	DK=CK+D	POT2	-17
	DK2=DK++2	POT2 -	
	ሽ1=8-1 በእጸ=በ¥2/8-0	P012 P012	20
	DK4=2.04DK8	POTZ	
	DK12=DK2/12.0	POT2	22
	CH=0.5	PUTZ	23
		P012	
	DD=2+0+DK	POT2	26
·	DDH*DD	PUTZ	27
	D1=0.25+DK2	POT2	- 28
	57=UX2/24+U DR 3 I=1+H	P072	2.7
	B1=0.0	PUTZ	31
	84=2.0/DN	POT2	32
	B2≠B5/B4−DH	PUTZ	
	B3≠−0+3+65	P012 P0172	35
	D4≈DX8≠B4	POTZ	36
	DD4=2.0#D4	POT2	37
	CN=1.0	POTZ	38
	K=1 C3≠0.0	POT2	40
<u> </u>	- C4=0.0	POTZ	41
	C7=0-0	, POT2	42
•	C8≠0.0 DD 2 1-1 N	POTZ	43
		° POTZ	45
	$C1=CH \neq CJS(A1)$	~ POT2	46
	C2=-CH# SIN(A1)	POT2	47
		P012 PCT2	18 49
	C9=C1=C3	PCT2	50
<u> </u>	- C10=C2-C4	PCT2	51
	C11=C5-C7	POT2	52
	112 #0 0-00 A (line la 63 0 0-04 00 10-06 0 10-01 0 10-07 12	PCT2	53
	A(2+4)=04+C9+B3+C10+05+C4+B2+C11-E1+C12	POT2	55
Ζ.	3 C3=C1	STGA	56
	24=C2	PCT2	57
•		PU12	50
~	(b=(b 91=+1)=01	P012	
	d3=33-D3	POT2	.61
	P4=34-1)4	POT2	62
		POT2	63
	UN=UN+∠aU 2 K=K+M2	POT2	65
	(MarMail)	POTZ	66
	เศ=ย์ส+วยิส	POT2	67
	3 DLM=550+5D 2015 JL=35 S	PUT2 2072	68 40
		POTZ	70

_		00 5 J=1,N	POT2	71
		DD 4 I=1,M1	POTZ	72
		K=K1+H-I	P012	73
	4	$A(1L_{1}K) = A(1L_{1}K) - A(1L_{1}K-1)$	POT2	- 74
		$A = \{1, k\}$ $\{1, 2\}$ $\{2\}$ $\{3\}$ $\{3\}$	POT2	75
	ŝ		POT2	- 51
	ر		PU12	10
-			PU12	
		DH=0.0	PU12	78
			POTZ	79
		00 12 I=1+H	POT2	80
		C7=0.C	POT2	81
		€€=0.0	POTZ	82
		C = 0	POT2	ÂÄ
	-		8012	
			0070	07
			10,12	07
		P2=0+0	PUIZ	86
		CN=1.0	POTZ	87
		66=0.5*0K12	POTZ	88
		K = 1	POTZ	89
		10 IJ J=1,N	POT2	- 90
		A1=CH/CN	POT2	91
		A2=D//CN	POT2 1	92
			POTO	02
	7		1012 NOT2	7.1
	1		PUTZ	
		B2=−DK/(6.0∓LN)	POTZ	95
		GC TU 9	POT2	96
	5	b3= SIN(A1)/A1	POT2	97
		B1=2.0*B3	POT2	- - 9 8
		62=(63- COS(A1))/A2-OH/CN+63	20T2	99
	9		PNT2	100
	•	84= STN(42)/Ch	POT2	101
			- FUIZ	101
			2012	102
			P012	103
		85=0H+CN	POT2	104
		C1=55+C4-2.6+C3	POT2	105
		C2=-2.0+C4-E5+C3	POT2	106
		C5=C1-C7	POTZ	107
<u> </u>		C6=C2-Ca	POT2	108
		P3=P2-Bb+CN	2012	300
-		P4=P3+2 040/124/0N=1 01	0072	
		· · · · · · · · · · · · · · · · · · ·	FU12	110
		At19K/=At19K/+t0-P1+t0+P3+t0+P4t04	PUIZ	111
		A(2,K)=A(2,K)+C6+P1=C5+P3=C4-P4=C10	POT2	112
	-	PI=PI+DH	PQTZ	113
		P2=P2+CN+DK4	POT2	114
		CN=CN+2.0	POTZ	115
		C7=C1	POT2	114
	~ • • •		- UIL	110
				117
			ruiz	11.9
			POTZ	119
		86=86+9812	POT2	120
	10	K≠k+H2	POT2	121
		CH=CH+DK	POTZ	122
	· <u> </u>	DH=DH+LOH	POTZ	123
	12	00++00 · · · · · · · · · · · · · · · · ·	POT2	ĩŽ∡
		D3=CK7(2.0+3.14159265)	0012	125
			FU[2	125
			7016	140
			PULL	127
			POTZ	128
		UU 14 J=19N	POTZ	129
		$C1=03 \neq SIN(A1)$	POT2	130
•		C2=-D3+ C0S(A1)	POT2	131
		DO 13 I=1,M	POT2	132
		DFE = A(1,K) + C1 + A(2,K) + C2	2012	- 111
		$A(2 \cdot 6) = A(2 \cdot 6) \neq C 1 - A(1 - K) \neq C 2$	PNT2	124
~ "			IVIC	
	17		1012	132
	т. Т		PUIZ	136
			POTZ	137
	14	AI=AI+UH	POT2	138
•	**	RETURN	POTZ	139
		END -	POT2	140
	-			

		ST PL OUTINE OREDISEDX, SEDY, SEDH, KSED, SENX, SENY, SENH, KSEN, DA, T	DRED	_2
		3 9AA, YY, IX, L, MLC, H, MD, NB, NEH, NH, KSFS, IPRINTJ	DRED	3
		DIMENSION SEDX(NB,1),SEDY(NB,HD,1);SEDH(NH,MB,1),KSED(1)	DRED	
		1 -,5FRX(1),5FRY(1),5FRH(1),DA(1),F(NR,1),RLC(2,2,1)	DRED	
		2,XX(1),YY(1)	DRED	<u> </u>
τ		5000-1 C A/	UKĘU DĖCO	
<u> </u>			DREU	
		$\frac{1}{1} \frac{1}{1} \frac{1}$	DAED	10
		JE INCLE OF ITTETTL-TOBINT-INGTOFTE	DREU DDED	-11
		JE (NEW-EQ-1) INICE TEXING TO VALUE	NRED	12
			n <u>ren</u>	- 11
		NP=KSED(N)	ORED	14
		IF (NP) 736.176.100	DRED	15
ũ			DRED	16
Ċ		A SPLINE-SURFACE FOR THE DEFLECTION IS FITTED TO VALUES	DRED	17
Ċ		OF DEFLECTION AT GIVEN POINTS.	DRED	18
¢			DRED	19
	100	IF (NB-NP) 73C,120,120	DRED	20
	120	CONTINUE	DRED	Ž1
		KP=100	DRED	22
		CL 140 IP=1,NF	DRED	23
		SFDX(1P,H)=0A(AP+1)/DA(24)	DRED	24
		SFDY(IP,H,1)=0A(KP+2)/0A(24)	DRED	25°
		SEDH(IP,H,2)=LA(KP+3)	DRED	26
		SF CH(1P, M, 1)= SFUH(1P, M, 2)	DRED	21
~	140		UKED	- 28
L C		SPLINE-SURFALE FIT DATA	UKEU	2.9
C	145		DRED DPED	
	147	LEFIRITE) 15C+160+150	DRED	32
	T50		DRED	
		NATT (IN 10)	DRED	34
C			DRÉD	35
-	166	CENTINUE	DRED	36
		CALL SURF1(NH,KSFD(M),T,SFDX(1,M),SFDY(1,H,1),SFDH(1,H,1),IRITE)	DRED	37
		GG TO 200	DRED	38
C	-	PRESENTLY FOR PITCH AND PLUNGE OF FORM Z=A0+A1+X	DRED	- 39
	170	SFDH(1,H,1)=DA(52)	DRED	40
		SFDH(2,H,1)=DA(53)+DA(24)	DRED	-41
		SFCH(3,H,1)=0+0	DRED	42
		GU TJ 145	DRED	43
-	266	ICHECK=0	DRED	44
		RE LUKN	DRED	45
د ب	-		UKEU-	40
, ,		TUR HOUTELED WIND 3-Calculate Referition on the opticial Mine	DRED	41
· 2			DRED.	- <u>TO</u>
r r		REFACE FIT DATA	DEED	50
r			DRED	- <u>5</u> Ť-
v	400	CONTINUE	DRED	52
	· <u> </u>	IF(KSF0(H).EQ.0) G8 T0 500	DRED	
		KP=KSFC(M)	DRED	54
Ċ		CALCULATE LOCAL MACH NUMBER ON PHYSICAL WING (IMPUT POINTS)	DRED	55
		CALL SURF2(SFDX(1,H),SFDY(1,H,1),J,KP,0,T(1,1),DUN,DUH,SFNX,SFHY	DRED	56
		s sentextsenter	DRED	5.7
С		STORE TRANSFORMED DATA	DRE0	
		20 423 1=1,00	DRED	59
	450	ΣευΫ(Ι,Μ,2)=SέζΫ(Ι, <u>Η,1)*Γ(Ι,1)</u>	DRED	60
٤		FIT JEFLECTION DATA IN TRANSFORMED SPACE	DRED	61
		CAL_ SUPFI(N#,KF,T,SFDK(1,H),SFDY(1,H,2),SFDH(1,H,2),IRITE)	DRED	62
		NETU-N	DRED	63
	203	ICHECN=1CHELY+1	DRED	64
		IF(1CmECk.01.1) 00 13 560	DRED	65
¢		SEL: " "JINTS ON TRANSFORMED WING FOR DEFLECTION SURFACE-FITTING	DRED	66
			UKEU Dech	
		- UHLL	DRED	00 £0
		* ************************************	NRED	76
		エビ ビョース アルキャイキャチー ガンネイビスエックノブダー	~~~~	4 ¥

C COMPUTE Y-CLURGINATE OF PUINTS ON PHYSICAL WING CORRESPONDING	DRED	71*
C TU THOSE SELECTED ON TRANSFURMED WING	DRED	72
00 500 K=1+KSFS	DRED -	73
DEL=0.0	DRED	74
X=SFDX4K9H1	DRED	75
Y=SF5Y(1,M,2)	DRED	75
520 Y=Y+J{L	DRED	77
C FIND MACH NUMBER AT (X,Y) ON PHYSICAL WING	DRED	78
CALL SURF2(X,Y)1,1,1,1,EM, DUM, EMY, SFMX, SFMY, SFMH, KSFM, 3)	DRED	79
$S1 = SFDY(K_1, M_1 \leq J = Y \neq _n$	DRÉD	80
IF (ABS(S1) LE + ERRA) 40 TO 530	DRED	81
<pre> DE1 = 51/{L++Y*[+Y+1.c-?]} </pre>	DRĚĎ	82
GG TC 520	DRED	83
C STORE Y HE PHYSICAL SPACE	DRED	84
530 SEDY(K.M.1)=SEDY(K.M.2)/(EH+1.4-20)	DRED	85
550 CONTINUE	DRĔÐ	86
1 60 TE 580	DRED	87
560 DC 570 A=1.KSFS	DRED	88
SFDX(K,M) = SFDX(K,MK)	DRED	89
$SFCY(X, H_{1}) = SFLY(K, H_{1})$	DRED	
570 SEDYEK, H+2)=SELY(K+NK+2)	DRED	91
580 CONTINUE	DŘED	92
C COMPUTE DEFLECTION AT SELECTED POINTS ON TRANSFORMED WING	ÔRED	93
C BY CALCULATING DEFLECTION ON THE CORRESPONDING POINTS ON THE	DRED	
C PHYSICAL WING	DRED	95
CALL SURF2(SFDX(1,H),SFDY(1,H,1),1,KSFS+0,T(1,1),DUM,DUM	DRED	96
<pre>\$</pre>	DRED	97
00 610 1=1.KSFS	DRED	98
610 SEDH(I,H+NEH)=T(I,1)	DRĖĐ	99
	DRED	100
IF(IRITE) 620,630,620	DRED	. 101
620 WRITE(IW,40) F	DRED	102
WRITE (1W,10)	DRED	103
630 CONTINUE	DRED	104
	DRED	105
C FIT DEFLECTION OF TRANSFORMED WING BASED ON SELECTED POINTS	ÓRED	106
CALL SURF1(NH,KSFS,T,SFDX(1,H),SFDY(1,H,2),SFDH(1,H,2)	DRED	107
s ,IRITE)	DRED	108
RETURN	DRED	109
730 IPR=98	DRED	110.
GO TO 750	DRED	111
750 WRITE	DRED	112
0 (IW,20) IPR	DRED	113
STOP	DRED	114
10 FORMAT(1H0,10X,73HCOMPUTED_DEFLECTION = A0+A1+X+A2+Y+ SUM. OF H(I)	* DRED	115
$((1) + 2) + (\Delta ((1) + 2))$	DRED	116
20 FCRPAT(100,102,100) ATA-10)	DRED	117,
30 FURMAT(ING. BX, 2000PHYSICAL, PLANE MUCE NC., 13)	DRED	118
40 FUMMATTING, 68, 29MTRANSF3-MES PLANE MOUL NC., 13)	DRED	119
55 FURMAT(1H1)	DRED	120
ing	DRED	121

		-÷. •
SUBROUTINE SLCT (L. NB. NEW. MLC. ISLCT. IV. XX. YY. XI. YI. JRITE)	SICI	992: X 🖓 🗍
L INPUT (NUMBER OF SPANWISE ROWS)	SIL	19 A 19
NB INPUT (HAXIMUH MUNBER OF POINTS ALLONED IN DIMENSION).	. 13.4	That we have
NLC INPUT (ORDER OF FIRST AND LAST WING BOX OF I-TH COLUMNS		
NEW INPUT ISELECT FROM 1-PHYSICAL, 2-TRANSFORMEDI		1. S.
JRITE- INPUT (INTERNEDIATE RESULTS PRINT-USI CURTRUES		
DINENSION NECTOR 2. 11. YVIII. YVIII. YVIII. YIIII	SIC	4
NTTEO	SLCT	20
DQ 20 1+1+L	SECT	11
IF (MLC(NEN,1,1).EQ.0) GO TO 20	SLCT	12
NTOT=NTOT+HLC(NEW,2,1)-HLC(NEW,1,1)+1	SLCT	13
20 CONTINUE	SLET	14
NP=0	SLET	32
NPT=0	SLCI SLCI	17
r-3 T=0	SLOT	14
	SLCT	
DN=FLOAT(NTGT)/FLOAT(NB)	SLCT	20
IF(DN-LT-1-0) DN=1-0	SLCT	21
1F(JRITE-EQ.0) GO TO 25	SLCT	22
WRITE(IW,200)	SLCT	23
<u>IF(NEW.EQ.1) HRITE(IH,210)</u>	SLCT	24
[F(NEW_EQ_2) WRITE(IW,220)	SECT	25
WRITE(IN,230)	SLUT	- 20
20 NF=NF+1 20 IC42 IS NRTA CO TO E0	51.07	21
JU IFINALE. NF1 J GU TU 70	SLCT	- 29
1-1+1 NPTP=NPT	SLCT	30
IF (HLC(NEW,1,1),E9.0) GO TO 30	SLCT	31
NPT=NPT+MLC(NEH,2,I)-HLC(NEW,1,I)+1	SLCT	32
GC TO 30	SLCT	33
50 XI(NP)=XX(I)	SLCT	34
J=K-N9IP	SLCT	35
Y1(NP)=YY(J)	SL <u>CI</u>	36
IF(JPITE.GT.O) WRITE(JW,10G) 1,J,K,XI(NP),YI(NP)	SLUI	31
	SLUT	
N 14 D 4	SICT	40
$R_{\rm H} = 0.174$	SLCT	41
	SLCT	42
IFIK.GT.NTOT) GO TO 80	SLCT	43
GC TO 25	SLCT	44
60-WRITE(IH+25C)	SLCT	45
CC 79 1=1,NP	SLCT	46
76 WRITE(Id,116) I,X1(1),Y1(1)	SLCT	47
	5LC1	40 20
CU LUNTINUE ISICT-NO	3LUI 51 01	47
	SLOT	51
100 F(R#41(5%+15+104)14-7)	SUCT	52
$110 FCKMAT(1 + 1CX + 14 + 1P4 \pm 14 + 7)$	SLCT	53
200 FORMAT(IH1,4X,19HSELECTED PCINTS UN)	SLCT	54
210 FORMAT(1H+,23X,12H PHYSICAL)	SLCT	5 5
220 FORMAT(14++23K+12HTRANSFSRMED)	SLCT	56
Z30 FORMAT(1H+,35%,31H+ING FOR SPLINE-SUSFAGE FITTING//	SLCT	57
\$9%,1HI,4%,1HJ,4%,1HK,,+%,5HX1(%),9%,5HYI(%)/)	SECT	58
250 FLRMAT(1H0,5X,59HNUMBER OF PDINTS SELECTED IN SLCT EXCEEDS ALL	OW SLCT	59
SAOLE LIMIT7714X,1H1,3X,5HX1(1),9X,5HY1(1)/)	SLCT	60
	SI CT	4 1

		SUBROUTINE WVAL(XX,YY,XTDG,YTDG,YTDG,XTE,SFDX,SFDY,SFDH,KSFD,S,D,CK	HVAL	2
		s , IN, L, ML, MI, NEN, NST, MB, MD, NB, NN, KSFS, IPRINT)	HVAL	• 3
C		CALCULATES DOWNWASH VELOCITY DISTRIBUTION (REAL AND IMAGINARY)	WVAL	4
		DIMENSION XX(1),YY(1),XTDG(1),YTDG(1),XTE(2,1),S(2,MB,1),HL(2,1)	MANT	5
_	!	s	HVAL	6
		IRITE=IPRINT/1C	WVAL	7
		IF(NEH.EQ.1) IRITE=IPRINT-10#IRITE	WVAL	8
		JLP=KSFD(M1)	,HVAL	
-		IF(KSFD(H1).EC.O.AND.NEW.EQ.2) JLP=KSFS	WYAL	10
		JL=hL(NEH,L)	WVAL	11
			HVAL	
		00 5 J=1,JL	WVAL	13
		<u>D0 5 K=1,2</u>	WYAL	17
	5	S(K,J,I)=0.0	UVAL UVAL	15
				12
			WVAL	
	40		NVAL	20
	<u> </u>		WWAI	
		141XX113+61+1X1218289337033 00 10 10 10	HÝAL	22
			WVAL	
		5 531 543 10 5 51 54 544 10	WVÁL	24
			WYAL	25
	70		WVAL	26
•	80	CONTINUE	WVAL	27
		IFIIRITE) 100-200-100	WYAL	28
	100	WPITE (IW,10)	WVAL	29
		IF (NEW.EQ.1) HRITE (Id)12) HI	WVAL	30
		IF (NEW.EQ.2) WRITE(IW,14) H1	WYAL	31
	10	FCRMAT(1H1,10),47HUPWASH (REAL, IMAGINARY, ABSOLUTE, PHASE ANGLE))	MĂVI	32
	12	FORMAT(1H+,56X,28HPHYSICAL PLANENODE NO.,13/)	WVAL	33
	14	FORMAT(1H+;58X;31HTRANSFORMED PLANEHODE NO.,13/)	WVAL.	34
		$DO \ 170 \ I = 1.4 L$	MANF	35
		JL=ML(NEW_1)	WYAL	36
		IF (JL) 110,176,110	HVAL	37
	110	WRITE(IW, 20) 1	NYAL	
		JLP=JL/2	ETAL.	39
	-		WVAL	
		UU 160 J=19JLP C3=C00T2C2) - 1145/1-4 1145/2-4.1145/2-4.114		42
		51=30K(13(1)+3(1)+3(1)+3(2))+11+3(2))+10(2))0(2))0(2))00(2))00(2))00(2))00(2))00(2))0(2))	NVAL	
		1713140140407 40 10 120	HVAI	44
	•		WAL	
	120	52557=29578\$ATAN2{\${2, (.1);57	HVAL	46
	1 10		WVAL	47
		IF(J1.LE.JL) GC TO 150	HVAL	48
			WVAL	49
		\$3=0.0	WYAL	50
		S4=0.0	WVAL	51
		GO TO 160	WYAL	5Ż
	150	CONTINUE	HVAL	53
		\$3=\$QRT(\$(1,J1,1)+\$(1,J1,1)+\$(2,J1,J1)+\$(2,J1,1)	HYAL	54
	-	IF(53.6T.0.C) GO TO 155	WVĄL	55
		S4=0.0	UVAL	.56
		GO TO 160	HVAL	57
-	155	S4=57.29578+ATAN2(S(2,J1,J1,S(1,J1,J1))	WVĄL	58
	160	HRITE(IH,25)J;S(1,J,1),S(2,J,1),S1,S2,J1,S(1,J1,I);S(2,J1,I);S3+S4	WYAL	59 [.]
	170	CONTINUE	HVAL .	_ 60
С	-	THESE ARE THE UPWASHES	WVAL	61
С			WVAL	62
	200	CUNTINUE	HVAL	63
		RETURN	WVAL	64
	20	FORMAT(1H035X,12,1+H-TH SPANWISE COLUMN)	WVAL	65
•	25	FGKMAT(1H ,5X, Z(2*, I3, 1P4E13.5))	HVAL	66
		END	HVAL	6 /

	BOXP	<u>~2</u>	
1 9 IPRINT9HET9HEC9ANA 2 - HAYATANGANGANTANGHANSTATKANGANGANGANG	BOXF BOXP	3	
C ICHECK=0 - PUTENTIAL AS COMPUTED 3H 30XPO		5	
C ICHECK+1 -HITH LEADING EDGE CORRECTION	<u>* 80XP</u>	· · · · · · · · · · · · · · · · · · ·	
C ICHECK=2 - PRESSURE CREEFICIENT CONPOTED FROM TRANSFARMED VALUE.	BUXT	· · *	
C FOR PHYSICAL WING	BOXP	. 9	
DINENSION XX(1), YY(1), XTDG(1), YTDG(1), XTE(2,1), XLE(2,1), A(2,HC,HA)	BOXP	. 10	
<u>1</u>	BUXP	12	
3 (AHA(MB)MB))	BOXP	- 13	
IPRIN=IPRINT	BOXP	14	
KRITE=IPRIN/10000 TPPTN=TPPTN_10000	BUXP Roxp	15	
JRITE=IPRIN/100	BOXP	- 17	
IPRIN=IPRIN-100+JRITE	BOXP	1.8	
IRITE*IPRIN TEINEW_ED_1) CO TO 160	BUXP	19	
KRITE+KRITE/10	BOXP	21	
JRITE=JRITE/10	BOXP	22	
IRITE=IRITE/IC	BUXP	23	
140 KRITE=KRITE-(KRITE/10)+10	BOXP	2.5	
JRITE=JRITE-(JRITE/10)#10	BOXP	26	
IRITE=IRITE-(IRITE/10)#10 -	BUXP	27	
NSHOS=0	BOXP	` 29	
0H=0.5+D	BOXP	30	
	BOXP	31	
s pIWyLyMByMC,ML,MLC,MLW,MI,NEWyMST,JRITEJ	BOXP	33	
C	BOXP	34	
C BOXPO COMPUTES THE POTENTIAL VALUES IN EACH BOX.	BUXP	35	
C	BOXP	37	
1CHECK=0	BOXP	38	
ME₩±NE₩	_ 80XP 80XP	39	
IF(IXITE.EQ.0) GO TO 270	BOXP	41	
WRITE(IK+30)	BOXP	42	
200 DG 205 I=1.4 DC 205 J=1.4MAK	BUXP	43	
DC 205 K=1.2	BCXP	45	
205 T(J,I,K)=S(K+J,I)	BOXP	.46	
215 IF(MEW_EQ_1) PRITE(IW_02) M1 15/MGL E0 23 LDITE(IW_02) M1	BOXP	47	
TO FORMATCHINING THE CIMPSON AL CALCULATED (REAL, IMAGINARY, ABSOLUTE,	ECXP	49	
S PHASE ANGLE))	FOXP	50	
32 FCFMAILIH+,712,26HPHYSICAL PLANEMCOL NU.,13/} 34 FD2M/I(3H4,23),28HPHYSICAL PLANEMCOL NU.,13/}	BUXP	51	
C PRINT-CUI	BOXP	53	
215 DC 250 I=1+L	ROXP	54	
J[≠HE(HEngI) 15 (11) 270-100-000	EQX6 POX6	55	
220 WRITE (14,26) I	BOXP	57	
JLV=JL/?	60X2	58	
IF(JL-2+JLP.NE.0) JLP=JLP+1	BOXP	59	
60 240 J=1,JLP	BUXP	60 61	
S1=S02T(T(),T,1)#T(),T,1)#T(),T,1)#T(),T,2)#T(),T,2)	BOXP	62	
S1=SORT(T(J,I,1)+T(J,I,1)+T(J,I,2)+T(J,I,2)) TF(S1=NE+0+0) GD TO 224		63	
S1=SQRT(T(J,I,1)+T(J,I,1)+T(J,I,2)+T(J,I,2)) IF(S1.NE.0.0) GD TO 224 S2=0.0	BOXP		
SI=SQRT(T(J,I,1)+T(J,I,1)+T(J,I,2)+T(J,I,2)) IF(S1.NE.0.0) GD TO 224 S2=0.0 GD TO 226 224 CENTINUE	BOXP BOXP BOXP	64	
S1=SQRT(T(J,I,1)*T(J,I,1)+T(J,I,2)*T(J,I,2) IF(S1.NE.0.0) GD TO 224 S2=0.0 GD TO 226 224 CGNTINUE S2=57.29578*ATAN2(T(J,I,2),T(J,I,1))	80XP 80XP 80XP "80XP	64 65 66	
S1=SQRT(T(J,I,I)*T(J,I,I)*T(J,I,2)*T(J,I,2) IF(S1.NE.0.0) GD TO 224 S2=0.0 GD TO 226 224 CONTINUE S2=57.29578*ATAN2(T(J,I,2),T(J,I,I)) 226 CONTINUE	BOXP BOXP BOXP BOXP BOXP	64 65 66 67	
S1=SQRT(T(J,I,1)*T(J,I,1)+T(J,I,2)*T(J,I,2) IF(S1.NE.0.0) GD TO 224 S2=0.0 GO TO 226 224 CGNTINUE S2=57.29578*ATAN2(T(J,I,2),T(J,I,1J) 226 CONTINUE J1=J+JLP IE(1)-1b-11 = 0 E0 E0 230	BOXP BOXP BOXP BOXP BOXP BOXP BOXP	64 65 66 67 68 68	
<u> </u>	\$3=0+0	BOXP	71
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	S4=0.0	BOXP	72
		BUXP	73
		BUAP	۴) عد
230		ROYP	
230	S3=SQRT(T(J),T_1)+T(J1,I,1)+T(J1,I,2)+T(J1,I,2)}	BOXP	77
<u> </u>	IF(53-NE-0-0) G0 10 234	BOXP	78
	S4=0.0	BOXP	79
	<u> </u>	BOXP	- 80
234		BOXP	81
	\$4=57.29578+ATAN2(T(J1,1,2),T(J101,1))	BGXP	82
236	CONTINUE	BUXP	53
240	HKIILLIH923J J914J914J914J91427931932	BUAP	85
250		BUXP	86
c		BOXP	87
	CONTINUE	BOXF	
	IF(ICHECK.GE.1) GO TO 400	BOXP	89
<u>C</u>	LEADING EDGE CERRECTION	BUXP	90
	DD 38C J=1; JMAK	BOXP	91
	IF (HLT(NEW,1,J).E0.0) G0 T0 285	BOXP	92
		BUXF	
		ROXP	97
		BUXE	
	K=I	BOXP	97
	IF (AR (J, I, NEW).GE. 1.0) GO TO 290	BUXP	98
280	CONTINUE	BOXP	99
285	\$3=0	BOXP	100
290		BOXP	101
	33≖XX{K}}−X\\C{M\NgJ}−DM+33 DC 370 T+1.4	-BUXP	102
	C1=(YY(1)=X)(1)(X)	ROXP	103
	IF(S1) 300,34C,310	BOXP	105
300	S1≠0,0	BOXP	106
	GD TO 340	BOXP	107
310	IF(YE) 320,320,330	BUXP	108
320	SI=SL#(XX(1)+XLE(NEH+J))/(S3+Z+XLE(NEW+J))	BUXP	109
330	CJ=EDUINEN' 434200 1123 / 21=240	80AF 80Y2	110
340	D0 350 K=1+2	BOXP	-112
350	S[KgJgI]=S1+S[KgJgI]	BOXP	113
370	CONTINUE	BOXP	114
380	CONTINUE	BOXP	115
	1CHE CK=1	BOXP	116
	IF(IRITE) 390,400,390	BOXP	117
390	HKITC(1H+36)	BOXP	118
36	FORMAT(1H1,19%,61HPOTENTIAL CORRECTED (REAL, IMAGINARY, ABSOLUTE,	BOXP	119
c	TANNER ANGLEIT	BUXP	120
C	TRACETER TO THE EXTREMOL OF CORRECTED VELOCITY FORMULA	BUXP	121
400	CUNTINUE	BOXP	123
	1F (KAITE.EG.0) 60 TO 700	BOXP	124
	IF(ICHECK.GE.2) 63 TO 520	BOXP	125
C	CALCULATE AND PRINT PRESSURE COEFFICIENT	BOXP	126
	ICHCCK=2	BOXP	127
		BUXP	128
		BUXP	130
	T(J,[,3]=S(1,J,1)	BOXP	131
410	$J(J_2,J_3,J_3,J_3,J_3,J_3,J_3,J_3,J_3,J_3,J_3$	BOXP	132
420	JMAK= JMAX (HEH)	BÖXP	133
-	CC 43C 1=1,L	BOXP	134
-	JL=M2(HEW,1)	BOXP	135
	() 430 J=1+JL () () () () () () () () () () () () () (BUXP	136
6.20	UU 43V F=194 T f 1_7 _K1=0.0	80XF 80YP	130
9C#	DC 536 J≈1•JMAK	BOXE	139
	11=4LT(MEK, 1, J)	BOXP	140
		-	-

ORIGINAL PAGE 13 OF POOR QUALITY

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	12=HLT(HEW929,J)-HLT(HEW919J)+1 .	BOXP	141
		BOXP	142
		BUXP	143
		BOXP	144
	1(1) 0;J)-ALCAPEN;J)	BOXP	145
	(1,12,5)=0.0	BOXP	147
	IF (ABS(XLE(MEH,J)-XX(II)).GT.1.E-05) GO TO 445	BOXP	148
Ċ	ADJUSTNENT LEADING EDGE AND FIRST BOX COINCIDES	BOXP	149
_	11=11+1	BOXP	150
	IK=IK-1	BOXP	151
445	CONTINUE	BUXP	152
	DU 400 I=2+1K	ROYP	154
-	T(1, 0, 0) = XX(1)	BOXP	155
		BOXP	156
	T(1,12,5)=T(J,11,4)	BOXP	157
	T(I-1,1,5)=XX(II)	BOXP	158
450		BOXP	159
	CALL SPLN1(12,T(1, 1,5),T(1, 2,5),T(1, 4,5)	BOXP	160
	5 , 1K, T(1, 6,5), T(1, 10, 5), T(1, 14, 5), NSMUS)	BUXP	-101
	CALL SPLNI(12)1(1) 10301(1) 30301(1) 303	DUAP	162
:	\$ \$1K91(19 093791(19129379111919939636033 11=11	BOXP	164
	DR 470 1=1.12	BOXP	165
	T(1,1)=T(1,4,5)-CK+T(1,3,5)	BOXP	166
	T(J,II,2)=T(I,5,5)+CK+T(I,2,5)	BOXP	167
470	<u>11=11+1</u>	BOXP	168
500	CONTINUE	BOXP	169
	WRITE (IW, 40)	BUXP	170
4 0	FURMAILINI,103,01HPRESSURE SUEPFICIENT (REAL) INAGINARIS ADJUGUES.	BOAF	172
		00X1	172
с_	TRANSFER TO PRINT-OUT SECTION	BOXP	174
5.76	50 13 213 1615 3 50 1 36 166677.50 31 61 16 700	BOXP	175
r 520	CALCULATE PRESSURE DUEFFICIENT ON PHYSICAL WING FROM NEW=2 RESULTS	BOXP	176
U U	00 500 I=1.L	BOXP	177
•	J1= 4LC(1,1,1)	BOXP	178
	J2=M_C(1+<,1)	BOXP	179
-	J3=J2-J1+1	BOXP	180
•		BUXP	101
C	TRANSFORMED Y-COURDINATE OF PHYSICAL WING ALONG THIN COLUMN	BOXP	183
	06 740 341133 Tf 357 57 247 f 14 144 (4	BOXP	184
540]4=]4+]	BOXP	185
	J4="¿C(2,1,1)"	BOXP	186
	JE=MLC(2,2,1)	BOXP	187
	JC=J++1 *	BOXP	188
	JD=JA	BOXP	189
c	KNOWN PEINTS OF TRANSFORMED WING ALONG 1-TH COLUMN	BUAP -	101
	UU 700 J=⊥9JU ▼1 4. (A.53°-974(T1) (AUXP	197
	TTT	BOXP	193
	T(J=10+2)=S(1+JG=1)	BOXP	194
	T(J,12,5)=S(c,Ju,1)	BOXP	195
560	J9=J0+1	BOXP	196
С	INTLAPULATE S AT T(J,1+5) OF TRANSFORMED HING	BOXP	197
	CALL SPLN1(J3 GT(1, 1, 2), T(1, 2, 5), T(1, 4, 5))	BUXP	1,00
	ε ε ε ε ε ε ε ε ε ε ε ε ε ε ε ε ε ε ε	ROYP	200
	LALL OFLALADIAA AADIAAADIAADIAADIAADIAADIAADIAADIA	BOXP	201
с	TRANSFORM S INTU PHYSICAL QUANTITY	BOXP	202
•	J4=J1	BOXP	203
	00 530 J=1, J3	BOXP "	204
	T(J4, I, 3)=T(J, 2, 5)/AMA(J4, I, 1)	BOXP	205
	T(J4,1,4)=T(J,3,5)7AHA(J4,1,1)	BOXP	206
580	J4=J4+ <u>]</u> 	BOXP	207
600		8087 8087	200
·		BIXP	
	1686-3	JUNI	

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	Ĺ	TRANSPER OF RETENTIAL INTERPOLAT	ING SECTION TO-OBTAIN	BOXP	211
	С	MALIES FOR PRESSURE COLFFICIENT	COMPUTATION ON PHYSICAL WING	BOXP	Z12
		GC T' 426	÷	BOXP	213
	700	CENTINUE -	•	BOXP	214
		KETUNN ²		BOXP	215
1	· ~ 20	TICHTITHU, 52, 12, 17H-TH SPANHISE	COLUMN)	BUXP	-216
	25	FORMATELE (2x,13,124813.5))		BOXP	Z17
		END		" BOXP 1	218

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S INLINGING INLINGING INLINGING INLINGING C SOLUTION SKILLYTY DIALING SOLVE SOLVENTIAL SOLVENTIAL DIREMSION SKILLYTY DIALING SOLVENTIAL SOLVENTIAL SOLVENTIAL - JARANGAMILTY DIALING SOLVENTIAL	SUBROUTINE BOXPOLXX,YY,XTDG,YTDG,XTE,A,AR,DAN,T,S,CK,D	BOXPO	2
C Solution of simultaneous counters Source Source Source 1 JARCHSJON XJANIJATEL JILSZAMBJI BORFO Source	\$ +IH+L+HB+HC+HL+NLC+HLH+HI+NEN+NST+JRITE)	BBXPB	\$`
DIRENSIDE XX:13,YY10:41,XT06(1);XT06(1	C SOLUTION OF SINULTANEOUS EQUATIONS FOR THE POTENTIAL	80XP8	<u></u>
1 ARR MS = MALL (12 AMB = JA AL2 AMB = JA 2 OH = 0.50 BDXPd BDXPd 0 DH = 0.50 BDXPd BDXPd BDXPd 0 IF (M = 112 + 0.01 G 0 T 0 25 BDXPd BDXPd </td <td>DIMENSION XX(1),YY(1),XTDG(1),YTDG(1),XTE(2,1),A(2,NC,1)</td> <td></td> <td>- 3</td>	DIMENSION XX(1),YY(1),XTDG(1),YTDG(1),XTE(2,1),A(2,NC,1)		- 3
C Hund 2510 mill 2510 million BDXPD BDXPD IF (HW HAC 2.2.0B.HL.CT.21.00 [0.25 BDXPD B	<u>1</u> , <u>ARIMB, M8, 1), TIZ, M8, 1), SIZ, M8, 1)</u>		- 7
Diff with (0,0) Diff with (0,0) Diff with (0,0) if (1,1) 00 10 25 00 70 10 c FRINT INFLUENCE COEFFICIENT B0XF0 12 discrete B0XF0 13 80 XF0 14 discrete B0XF0 13 80 XF0 13 discrete B0XF0 B0XF0 13 14 14 iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	2 97L1291797L129294797L7129479771117	BUATHA RAYPA	
IF AVERAGE 2007.01.07.17 GO TO 25 IODRO IODRO IO C MRITE(UN-LOC) BOXFO 12 IF AVERUALLO COLORFICIENT BOXFO 12 IF AVERUALLO COLORFICIENT BOXFO 12 IF AVERUALLO COLORFICIENT BOXFO 13 IF AVERUALLO COLORFICIENT BOXFO 14 IF AVERUALLO COLORFICIENT BOXFO 14 IF AVERUALLO COLORFICIENT BOXFO 15 IF AVERUALLO COLORFICIENT BOXFO 15 IF AVERUALLO COLORFICIENT BOXFO 15 IF AVERUALLO COLORFICIENT BOXFO 16 IF AVERUALLO COLORFICIENT BOXFO 16 IF AVERUALLO COLORFICIENT BOXFO 21 IF AVERUALLO COLORFICIENT BOXFO 22 IF AVERUALLO COLORFICIENT BOXFO 23 IF AVERUALLO COLORFICIENT BOXFO 23 IF AVERUALLO COLORFICIENT BOXFO 24 IF AVERUALLO COLORFICIENT BOXFO 25 IF AVERUALLONCOLORFICIENT BOXFO 25		- BOXIG	- 0
C HRINT INFLUENCE COEFFICIENT BOOKPO 12 HIECUNION BOOKPO 12 HIECUNION BOOKPO 13 HIECUNION BOOKPO 14 HIECUNION BOOKPO 15 OC 20 14:1. BOOKPO 15 BOOKPO 15 DO 15 JH-1,K BOOKPO 17 HIECUNION BOOKPO 17 HIECUNION BOOKPO 17 BOOKPO 17 HIECUNION BOOKPO 17 BOOKPO 27 20 CONTINUE 20 CONTI	IFLUEN-E0.2.0P.N1.GT.11 CO TO 25	BOXED	iÓ
INFLITE(IV.10C) BOXF0 12 JL-24KLINKH.1) BOXF0 13 K-JL/A BOXF0 14 IF(JL-4KK.NE.0) BOXF0 14 II BOXF0 15 00 20 I=1.L BOXF0 15 II BOXF0 15 II BOXF0 16 II BOXF0 17 II BOXF0 18 II BOXF0 18 II BOXF0 21 II BOXF0 23 II BOXF0 23 II BOXF0 24 D0 26 F1 BOXF0 II BOXF0 25 II BOXF0 25 II BOXF0 26 I	C PRINT INFLUENCE COEFFICIENT	BOXPS	11
1.1=2*RL(XHEW L) BDXP0 13 IF(JL-4*K.NE.0) K*K+1 BDXP0 15 DQ 20 [=1.L BDXP0 15 I1=[-1 BDXP0 17 MATTE(IM,10) II BDXP0 10 DO 15 JH=1,K BDXP0 10 20 CDMTINUE BDXP0 10 20 CDMTINUE BDXP0 20 20 CDMTINUE BDXP0 20 20 CDMTINUE BDXP0 22 20 CDMTINUE BDXP0 26 21 FIJSTTESON (GD D 28 BDXP0 26 1100 MATTS(IM) BDXP0 26 22 COMTINUE BDXP0 30 30 1100 NFLMS CAUG (GD D 28 BDXP0 35 24 COMTINUE BDXP0 36 BDXP0	WRITE(IW, 10C)	BOXPO	12
K-JL/A BOXP0 15 If (JL-4% KAE 0) K-K+1 BOXP0 15 00 20 I-1.4 BOXP0 16 III-1-1 BOXP0 17 WAITE(IW,110) IL BOXP0 17 00 15 JJ-1.4K BOXP0 17 20 CONTINUE BOXP0 17 21 CONTINUE BOXP0 17 22 CONTINUE BOXP0 17 23 CONTINUE BOXP0 17 24 CONTINUE BOXP0 27 25 CONTINUE BOXP0 26 26 API-AMINIATOG(II).AMI) BOXP0 26 26 API-AMINIATOG(II).AMI BOXP0 27 26 API-AMINIATOG(II).AMI BOXP0 28 27 IF(HELED.Q).GO TO 28 BOXP0 WHITE (TW,1160) BOXP0 30 27 ADIVIT UFSTREAP BOXP0 28 GONTINUE BOXP0 29 CONTINUE BOXP0 20 CONTINUE BOXP0 34 20 CONTINUE BOXP0	JL=2+HL(NEH,L)	BOXPO	13
If (JL-4*K.A.E.G) K=K*L BOXP0 IS 02 20 1-1.L BOXP0 IS 11=1-1 BOXP0 IS 00 15 J1-1.K BOXP0 IS 12 CONTINUE BOXP0 IS 20 CONTINUE BOXP0 IS 21 L=KSIT(NEW) BOXP0 IS 22 CONTINUE BOXP0 IS 23 CONTINUE BOXP0 IS 24 CONTINUE BOXP0 IS 25 CONTINUE BOXP0 IS 26 ANI-ALIAICATOCILIJANI) BOXP0 IS 26 ANI-ALIAICATOCILIJANI) BOXP0 IS 26 CONTINUE BOXP0 IS 27 CONTINUE BOXP0 IS 28 CONTINUE BOXP0 IS 29 CONTINUE BOXP0 IS 20 GONTINUE BOXP0 IS 29 ANXCILL-FELMS+1) BOXP0 IS 20 GONTINUE BOXP0 IS 20 CONTINUE BOXP0 IS 20 CONTINUE BOXP0 IS 20 CONTINUE BOXP0 IS 20 GONTINUE </td <td>K=JL/4</td> <td>BBXPD</td> <td>14</td>	K=JL/4	BBXPD	14
00 20 1+1,t BUXP0 10 11+1-1 BOXP0 17 11+1-1 BOXP0 18 10 NR1TE(1W+120) (1(J+A(1+J+1)+A(2+J+1)+J+J+J+J+J+J+J+J+J+J+J+J+J+J+J+J+J+	IF(JL-4*K.NE.0) K=K+1	BOXPO	15
11-1-1 B0XP0 10 00 15 11-4 80XP0 10 10 01 15 11-4 80XP0 10 20 CONTINUE 80XP0 20 20 80XP0 20 21 CONTINUE 80XP0 22 80XP0 24 80XP0 26 24 80XP0 26 26 80XP0 26 26 80XP0 26 28 80XP0 26 28 80XP0 26 28 80XP0 33 33 33 33 33 33 33 33 33 33 33 33 33 34 34 34 34 34 34 34 34 34 34 34 34 34 35 34 35 35 35 35 35 35 35 35 35 35 35	<u>00 20 I=1,L</u>	BUXPU	- 10
MAIE (LWF.10.) MAIE (L		DUARU	1.6
15 WD TH (TH, 120) (U,J,A(1,J,J)),A(2,J,I),J-J-JL,L,K) 00700 20 20 CONTINUE 00707 21 25 CONTINUE 00707 22 11-MSTATKEN 00707 23 00 26 T-1 00707 26 CONTINUE 00707 25 27 Continue 00707 25 28 CONTINUE 00707 26 28 CONTINUE 00707 26 28 CONTINUE 00707 27 29 CONTINUE 00707 27 29 CONTINUE 00707 27 20 CONTINUE 00707 27 2100707 Continue 00707 27 20 Continue		80220	
20 CONTINUE BOXPD 22 25 CONTINUE BOXPD 22 ANT=1.0 BOXPD 26 26 AF1=AMIN1(XTDG(1),AMI) BOXPD 26 26 AF1=AMIN1(XTDG(1),AMI) BOXPD 26 27 CONTINUE BOXPD 26 28 CONTINUE BOXPD 26 28 CONTINUE BOXPD 26 28 CONTINUE BOXPD 30 29 ANT BOXPD 30 29 CONTINUE BOXPD 30 20 CONTINUE BOXPD 30 20 CONTINUE BOXPD 30 20 CONTINUE BOXPD 30 20 CONTON CONTON 30 20 CONTON CONTON <td>15 WRTTF(TW-3203 ((]+A(]+J+T3+A(2+J+T3)+J≠J3+J(+K)</td> <td>BOXPO</td> <td>20</td>	15 WRTTF(TW-3203 ((]+A(]+J+T3+A(2+J+T3)+J≠J3+J(+K)	BOXPO	20
25 CONTINUE BOXPO 22 ANT-1.0 BOXPO 23 ANT-1.0 BOXPO 25 26 ANT-1.1 BOXPO 25 26 ANT-1.1 BOXPO 25 26 ANT-1.1 BOXPO 25 26 ANT-1.1 BOXPO 26 00 26 BOXPO 27 100 C BOXPO 26 27 ANTALLES	20 CONTINUE	BOXPO	21
11+MST(MEM) B0XF0 23 ANT=1_0 B0XF0 25 26 APT=AMHAT(ANDGG11)_AMH1) B0XF0 25 C IF 1_ARTIFLE_EG_01_GG TO_28 B0XF0 26 MR ITE_CTWRILES B0XF0 26 27 B0XF0 26 28 COMTINUE B0XF0 27 11±0 B0XF0 28 28 COMTINUE B0XF0 32 29 D0Y0 [=1;c B0XF0 33 20 D0Y0 [=1;c B0XF0 33 27 ADJUST (DF3TREAP INFLUENCE B0XFD 36 29 D0Y0 [=1;c B0XFD 36 80XFD 20 C B0XFD 36 80XFD 36 20 C B0XFD B0XFD 36 80XFD 37 21 F(MELME_F,1) B0XFD B0XFD 40 80XFD 40 21 I+MLAE_F,1) B0XFD B0XFD 41 80XFD 42 22 I+MEALAE_F,1) B0XFD B0XFD 42 1.5	25 CONTINUE	BOXPO	Z2
AH1=1.0 B0XE0 24 00 26 [F1,1] B0XE0 26 26 AH1=AHIN1(XD5(1),AHI) B0XE0 26 0 26 [F1,1] B0XE0 26 0 27 B0XE0 26 1 F 1,7 [T1,E,E0,0] GG TO 28 B0XEO 27 1 B0 B0XEO 28 28 CONTINUE B0XEO 28 1 B0 F1 = 0 B0XEO 28 28 CONTINUE B0XEO 30 1 B0 S0XEO 37 80XEO 37 27 ADJUST UPSTREAR INFLUENCE B0XEO 37 80XEO 37 28 CONTINUE B0XEO B0XEO 37 80XEO 37 26 Continue B0XEO B0XEO 37 80XEO 38 29 Continue B0XEO B0XEO 37 80XEO 38 20 JUST UPSTREAR INFLUENCE B0XEO B0XEO 36 37 20 L= 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	I1=NST(NEW)	BOXPO	23
00 26 1=1,11 B0XP0 26 26 AF1=AMINIXTDG(1),AMI) B0XP0 26 c IF(JRTTE_EQ.0) GG TO 28 B0XP0 27 wRITE(TW.160) G B0XP0 28 c B0XP0 28 B0XP0 28 c B0XP0 28 B0XP0 30 c MRITE(TW.160) B0XP0 32 c ADJUST WEAP INFLUENCE B0XP0 32 c ADJUST WEAP INFLUENCE B0XP0 34 c ADJUST WEAP INFLUENCE B0XP0 34 c ADJUST WEAP INFLUENCE B0XP0 34 c ADJUST WEAP INFLUENCE B0XP0 36 c IF(INFLINENCE B0XP0 37 c IF(INFLINENCE B0XP0 37 c IF(INFLINENCE <td< td=""><td>AMI=1.0</td><td>BOXPO</td><td>24</td></td<>	AMI=1.0	BOXPO	24
26 AFF=AHINI(ATOC(T),AMI) BURPU 27 C IF (JR ITE, ED, O) GG TO 28 BURPU 27 WR ITE (TWR 1660) BURPU 28 2.20 CONTINUE BURPU BURPU 29 .20 CONTINUE BURPU BURPU 29 .20 CONTINUE BURPU BURPU 29 .21 CONTINUE BURPU BURPU 31 .20 GONTINUE BURPU BURPU 33 .22 CONTINUE BURPU BURPU 33 .23 CONTINUE BURPU BURPU 33 .24 CONTINUE BURPU BURPU 33 .25 CONTINUE BURPU BURPU 34 .26 CONTINUE BURPU BURPU 36 .27 MURCHARCHARCH BURPU BURPU 36 .28 CONTINUE BURPU BURPU 36 .29 MURCHARCHARCHARCHARCHARCHARCHARCHARCHARCHA	00 26 1=1,11	BOXPO	25
C IF (JR ITE 20.0) GG TO 28 WR ITE (IW IG8) 28 CONTINUE 11=0 -28 CONTINUE 11=0 -29 CONTINUE -29 CONTINUE -29 CONTINUE -20 CONTONE -20 CONTINUE -20 CONTINUE -2	26 AMI=AMINI(XTDG(I),AMI)	BUXKU	- 22
14.03.116.10.00.10.20. 20 20 20 21 20 22 20.00.11 MUE 11=0 80XP0 31 30 00.900 21.15. 32 80XP0 33 80XP0 34 80XP0 35 80XP0 36 70 36 70 37 20 38 80XP0 39 80XP0 30 80XP0 31 30 31 30 32 31 30 CCMTINUE 31 30 32 60XP0 33 80XP0 34 30 35 50 36 50 36 50 37 50 38 50 39 50 39 50 30 50 30 50 30 50 31		BAYPA	29
28 CONTINUE BDXPD BDXPD 11=0 BDXPD 31 NFLMS = 0AN BDXPD 32 - NFLMS = 0AN BDXPD 32 - ADJUST UPSTREAR INFLUENCE BDXPD 33 - ADJUST UPSTREAR INFLUENCE BDXPD 36 - KO = 1 BDXPD 36 - F(HFLMS,EG.0) G2 TU 30 BDXPD 36 - F (HFLMS,EG.0) G2 TU 30 BDXPD 36 - JL = ML (NEH + 1) BDXPD 30 - IF (JL,E3.01) GC TU 30 BDXPD 30 - L = ALL(NEH + 1) BDXPD 80 - C JE=NU. DF MAKÉ BOXES IN ROM BDXPD C J= FLIST MAKE BOX BDXPD C J= FLIST MAKE BOX BDXPD C J= STLUER OF MAKÉ BOXES IN ROM BDXPD C J= STLUER OF FIRST MAKE BOX BDXPD J= J= J J= STLER OF FIRST MAKE BOX BDXPD J= J= J<		- BOX 0	29
11=0 0AN 00XP0 32 DD 90 [*1+* 80XP0 33 x xx(1) 80XP0 34 C ADJUST UPSTREAP INFLUENCE 80XP0 35 K0 = 1 80XP0 36 F(NFLMS, E0, 0) G2 TU 30 80XP0 36 x 0 JUST UPSTREAP INFLUENCE 80XP0 36 x 0 JUST UPSTREAP INFLUENCE 80XP0 37 x 0 = 1 80XP0 36 y 1 = NULAL, I-FFLNS+11 80XP0 37 x 0 = MAX0(1, I-FFLNS+1) 80XP0 37 y 1 = MING AAC WAKE UJXES 80XP0 40 C J==NL, 3F, MINE BOX BOXP0 40 C J==NL, ASC, WAKE UJXES B0XP0 C J==NL, 3F, MINE BOX BOXP0 44 C J==NL, 3F, MINE BOX BOXP0 47 C J==NL, 3F, MINE BOX BOXP0 47 J= J==N	28 CONTINUE	BOXPO	30
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	NFLNS = ÚAN	BOXPO	32
X=XX[1] B0XP0 34 "C" ADJUST UPSTREAP INFLUENCE B0XP0 35 K0 = 1 B0XP0 36 IF(INFLINS.EG.0) G2 TJ 30 B0XP0 37 K0 = MAXG(1,1-NFLNS+1) B0XP0 38 JL=ML(HEN:1) B0XP0 40 JL=ML(HEN:1) B0XP0 40 C JL=ML(HEN:1) B0XP0 C JENNL B0XP0 C JENL B0XP0 C JN=GL(EX) FIST MING B0X B0XP0 C JN=GL(EX) JENL B0XP0 47 JENL JENL JENL B0XP0 50 JF(I)	00 90 I=1,L	BOXPO	33
C AD JUST UPSTREAP INFLUENCE BOXPO 36 K0 = 1 BOXPO 36 IF (HFLWS.EG.D) C3 TJ 30 BOXPO 36 K0 = MAXC(1.1-NFLMS+1) BOXPO 37 '30 CCNTINUC BOXPO 39 JL=ML(MEH,1) BOXPO 40 C JF (JLLS.0) UC TJ 30 BOXPO C JENL.C. UF MAKE BOXES IN 80M BOXPO 42 C JENL.C. UF MAKE BOXES IN 80M BOXPO 43 C JENL.C. UF MAKE BOXES IN 80M BOXPO 44 C JENL.C. UF MAKE BOXES IN 80M BOXPO 44 C JENL.C. UF MAKE BOXES IN 80M BOXPO 45 C JENL.C. UF MIME BOX BOXPO 46 C JSHELLEST MAKE BOX BOXPO 46 JW=0 JSHELWE OF FIRST MAKE BOX BOXPO 46 JW=0 JSHELWE OF FIRST MAKE BOX BOXPO 46 JW=0 JSHELWE OF FIRST MAKE BOX BOXPO 47 JW=1 JSWEC OF FIRST MAKE BOX BOXPO 47 JW=1 JSWEC OF FIRST MAKE BOX BOXPO 47 JW=1 JSWEC OF FIRST MAKE BOX BOXPO 47 JSWED JSWEC OF FI	$\lambda = X \times (1)$	BOXPO	34
K0 = 1 BUXPU 30 K0 = MAX0(1,1-NFLNS+1) BUXPU 37 S0 CCMTINUE BUXPU 38 JL=ML(NEH,1) BUXPU 30 JL=ML(NEH,1) BUXPU 40 C DIFINE HING 2AL VAXE 30±5 JL=ML(NEH,1) BUXPU 41 C JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1) JE=NL(NEH,1)	C ADJUST UPSTREAM INFLUENCE	BOXPU	35
1F(NELNS, ECG, U) CG 10 30 BOXPO 36 10 CONTINUE BOXPO 38 10 CONTINUE BOXPO 38 11 30 CONTINUE BOXPO 38 11 JL=ML(MEM,1) BOXPO 40 11 IF (JL,ES,C) GC TG 30 BOXPO 41 11 DIFINE HING AKE VAKE dJxES BOXPO 43 11 JL=ML(MEM,1) BOXPO 43 12 JEFNL, OF MAKÉ BOXES IN ROM BOXPO 43 12 JESCL, CF MING BOX BOXPO 44 13 JESCL, CF MING BOX BOXPO 45 14 JS=2L-LEC OF FIRST MING BOX BOXPO 46 14 JS=2L-LEC OF FIRST MING BOX BOXPO 46 14 JS=2L-LEC OF FIRST MAKE BOX BOXPO 47 15 JE (I (L,LE,AFI)) CL T(13+ JS=2L-LEC OF FIRST MAKE BOX BOXPO 46 14 JS=2L-LEC OF FIRST MAKE BOX BOXPO 47 JS=2L-LEC OF FIRST MAKE BOX BOXPO 49 16 JE=AL-J BOXPO 50 JS=2L-LEC OF FIRST MAKE BOX BOXPO 40 15 JS=JS=JLEC OF TONE TABLEST MING BOX BOXPO	KO = 1	BUXPU	30
1 1 30 1 30 30 1 30 CENTING BOXPO 30 1 <th1< th=""> <th1< th=""> <th1< th=""></th1<></th1<></th1<>	, IF(NFLN3-EG-0) 60 10 30	80XP0	37
1 JL = MLLME +, : : :		BOXPO	39
: IF (JLLEG.0) GC TJ JJ BOXPO. 41 C DIFFINE WING AKC WAKE JJXES JW=NU. OF WAKE BOXES IN ROW BOXPO 42 C JE=NL. SF WING BOXES BOXPO. 43 C JS=LENC. SF WING BOXES BOXPO. 44 C JS=LECK OF FIRST WING BOX BOXPO. 44 C JN=CSJECK OF FIRST WING BOX BOXPO. 45 C JN=CSJECK OF FIRST WING BOX BOXPO. 45 C JN=CSJECK OF FIRST WING BOX BOXPO. 46 C JN=CSJECK OF FIRST WING BOX BOXPO. 47 JL JS=L.LEX OF FIRST WING BOX BOXPO. 47 JW=0 If (*.LEAFI) CL T(* 3% BOXPO. BOXPO. 47 J=1 BOXPO. BOXPO. 50 BOXPO. 51 J=1 BOXPO. S0 BOXPO. 52 J=1 BOXPO. S0 BOXPO. 53 J=1 BOXPO. S0 S0 S0 J=1 BOXPO. S0 S0 S0 J=1 BOXPO. S0 S0 <t< td=""><td>JI = ML (NEN . I)</td><td>BOXPO</td><td>40</td></t<>	JI = ML (NEN . I)	BOXPO	40
C DIFINE WING AND YAKE BIXES B0XP0 42 C JH=NG. OF MAKE BOXES IN ROW B0XP0 43 C JE=NL. GF WING BOXES B0XP0 44 C JS=7LUE OF FIRST WING BOX B0XP0 44 C JS=7LUE OF FIRST WING BOX B0XP0 46 C JS=7LUE OF FIRST WING BOX B0XP0 46 C JS=7LUE OF FIRST WING BOX B0XP0 47 JS=0 JS=0 JS=0 80XP0 JH=0 JS=0 JS=0 80XP0 JJ=1 B0XP0 42 80XP0 J=1 B0XP0 50 90XP0 J=1 B0XP0 52 80XP0 J=1 B0XP0 53 90XP0 J=1 B0XP0 53 90XP0 J=1 B0XP0 53 90XP0 J=1 B0XP0 53 90XP0 J=1 B0XP0 54 90XP0 J=1 B0XP0 55 90XP0 J=1 B0XP0 55 90XP0 JS J=1 B0XP0 62 90XP0 JSW=JE +1 <td>: IF (JL.EQ.0) GC TO 90</td> <td>BOXPO-</td> <td>41</td>	: IF (JL.EQ.0) GC TO 90	BOXPO-	41
C JMENL OF MAKE BOXES IN ROW BOXPO 43 C JEENL OF MIKE BOXES BOXPO 44 C JEENL OF MIKE BOX BOXPO 45 JS=CLUCR OF FIRST MING BOX BOXPO 46 C JN=CLOCE UF LAST WING BOX BOXPO 46 C JN=CLOCE UF FIRST MAKE BOX BOXPO 46 JN=CLOCE UF FIRST MAKE BOX BOXPO 46 JN=JS=JS FIEL J JS JS FIEL J	C DEFINE WING AND WAKE BIXES	BOXPO	42
C JE=KL. GF WING BOXES BOXPO 44 C JS=FLE® OF FIRST WING BOX BOXPO 45 UN=CR36+ OF LAST WING BOX BOXPO 46 JN=CR36+ OF LAST WING BOX BOXPO 46 JS=1 JW=0 If (*.LE_AF1) CL T(134 J=1 32 IF (J.JL) UL T(134 J=1 32 IF (J.JL) UL T(134 J=1 32 IF (J.JL) UL T(134 J=1 32 IF (J.JL) UL T(134 JW=JN+1 JS=JN+1	C JH=NU. OF MAKE BOX	ES IN ROW BOXPO	43
C JNSTRUCTURE DIAST WING BOX BOXPD 45 C JNSTRUCTURE DIAST WING BOX BOXPD 46 C JSWEL-SET UF FIRST WAKE BOX BOXPD 47 C JNWELNIT OF LAST WAKE BOX BOXPD 47 JNWELNIT OF LAST WAKE BOX BOXPD 47 JNWELNIT OF LAST WAKE BOX BOXPD 46 BOXPD 49 BOXPD 50 JSTRUCTURE DIAGNOUS OF PRECEDING ROWS TO UPWASH BOXPD 67 C SUBTACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPD 67 C SUBTACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPD 67 C SUBTACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPD 67 C SUBTACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPD 64 BOXPD 70	C JE=NU. OF WING BOX	ES BOXPO	44
C JN=C+C+C+C+C+C+C+ST WAKE BOX BOXPO 47 C JSW=L+C+C+C+C+FIRST WAKE BOX BOXPO 47 JW=C+C+C+C+C+C+C+C+C+C+C+C+C+C+C+C+C+C+C+	C JS=ZFUER OF FIRST	HING BOX BOXPU	45
C JW=0 JW=0 JW=0 JW=0 JW=0 JF(x.LE.AFI) CL T(134 J=1 32 IF(J+JT+L) CL T(134 J=1 32 IF(J+JT+L) CL T(134 JF(J+LT+L) CL T(134 JF(J+L+L) CL T(134 JF(J+L) CL T(134 JF	L JN=04064 57 LA31		40
JW=0 BUXPC BUXPC BUXPC J=1 BUXPC S1 32 If (x.LE.Arl) (L T(: 3+ BUXPC J=1 BUXPC S1 32 If (x.LT.UL) (L T(: 3+ BUXPC JH=JH=1 BUXPC S1 JSH=JH=1 BUXPC S2 JSH=JE +1 BUXPC S3 JSH=JE +1 BUXPC S3 JSH=JE +1 BUXPC S3 JSH=JSH=JE +1 BUXPC S3 JSH=JSH=JE +1 BUXPC S4 JSH=JSH=JE BUXPC S4 JSH=JSH=JE BUXPC S4 JSH=JSH=JE BUXPC S4 JSH=JSH=JE BUXPC S4 <tr< td=""><td></td><td>WAKE BOX DUAFO</td><td>4.5</td></tr<>		WAKE BOX DUAFO	4.5
if (1. LE.AFT) CL T(134 BOXPO 50 J=1 BOXPC 51 32 IF (1. JT.JL) VL T(1 54 BOXPO 52 IF (1. LT. (VT.L(N., 1)+J+)) VL T(154 BOXPO 52 JH=1 BOXPO 54 JH=1 BOXPO 56 JH=1 BOXPO 56 JH=1 BOXPO 57 JH=1 BOXPO 57 JH=1 BOXPO 57 JSJH=1 BOXPO 57 JSH=1 BOXPO 67 JSH=1 BOXPO 67 JSH=1 BOXPO 67 JSH=1 BOXPO 67 JSH=1 BOXPO 62 JSH=1 BOXPO 62 JSH=1 BOXPO 67 JSH=1 BOXPO 66 JSH=1 BOXPO 66 JSH=1 BOXPO 66 JSH=1 BOXPO 66		BOXPD	49
J=1 30XPC 51 32 If (J.J.J.JL) of T-J J4 60XPO 52 IF (J.J.J.JL) of T-J J4 60XPO 52 IF (J.J.JL) of T-J J4 60XPO 53 JH=JH+1 80XPO 54 3J=J+1 80XPO 56 6_T1_J2 80XPO 56 34 JE=JL_JA 80XPO 56 35 JS =JN+1 80XPO 57 JSW=I 80XPO 59 JSW=I 80XPO 60 GO TO 37 80XPO 62 JSH=JE +1 80XPO 62 JSH=JE +1 80XPO 63 JNH=JSH-JH-1 80XPO 64 JNH=JSH-JH-1 80XPO 65 JSH=JE +1 80XPO 65 JSH=JE +1 80XPO 65 JNH=JSH-JH-1 80XPO 65 JSH=JE +1 80XPO 65	IF (A.LE.AFI) CL TU 34	BCXPO	50
32 1F(1.5T.JL) v(T) sh b0xP0 52 1F(1.1T.(N_n,J)+J+1) v(T) ss b0xP0 53 JN=JH+1 80XP0 54 33 J=J+1 80XP0 55 0. T(J) J2 80XP0 57 34 JE=JL-Jn 80XP0 57 35 JS = JN+1 80XP0 57 35 JS = JN+1 80XP0 57 35 JS = JN+1 80XP0 57 36 JS = I 80XP0 60 36 JS = I 80XP0 61 37 JN = JS +JE+1 80XP0 62 37 JN = JS +JE+1 80XP0 65 37 JN = JS +JE+1 80XP0 66 1F (TI-E0.0) GE (TO b) b) BOXP0 67 0J 47 JS, JN BOXP0 67 0J 47 JS, JN BOXP0 67	₩ J=1 T T T T T	BOXPC	51
IF (**LT*() T_(N_m, j) + j+1) 0. ** js E0XP0 53 jk=jk+1 E0XP0 54 33 j=j+1 B0XP0 56 0. T() 32 B0XP0 56 34 j= j_1 1 P0XP0 57 i+ (-LN(N_N, j) + j+1) 30+ j>y 32 30 KP0 57 35 JS = JN+1 B0XP0 59 JSW=1' B0XP0 60 G0 T0 37 B0XP0 61 35 JS = T B0XP0 62 JSW=1E +1 B0XP0 63 37 JN = JS +JE+1 B0XP0 63 JN = JS +JE+1 B0XP0 64 JNW=JSm+JN+1 B0XP0 65 JSW=3E +1 B0XP0 64 JNW=JSm+JN+1 B0XP0 65 JSW=3E +1 B0XP0 65 JSW=3E +1 B0XP0 64 JNW=JSm+JN+1 B0XP0 65 JSW=3E +1 B0XP0 65 JSW=3E +1 B0XP0 65 JSW=3E +1 B0XP0 65 JSW=3E +1 B0XP0 66 JSW=3E +1 B0XP0 <td>32 IF(J.J.) VE TU 24</td> <td>60×P0</td> <td>52</td>	32 IF(J.J.) VE TU 24	60×P0	52
JN=JN+1 80XP0 54 33 J=J+1 80XP0 55 6_11/32 80XP0 56 34 JE=JL-Jn 80XP0 56 34 JE=JL-Jn 80XP0 56 35 JS=JN+1 80XP0 57 JSW=I 80XP0 60 59 35 JS=JN+1 80XP0 60 36 JS=I 80XP0 61 37 JN=JS+JE+1 80XP0 62 37 JN=JS+JE+1 80XP0 63 37 JN=JS+JE+1 80XP0 64 JNH=JS_H+JH-1 80XP0 65 65 1F(T11-E0+0) GCT0 60 66 80XP0 66 C SLBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH 80XP0 67 0J 47 JS, JN 80XP0 67 68 GC 45 K=K0,11 80XP0 67 KL=ML(NEN,K) 80XP0 70 69	IF(*aLTa(>Tu(NumyJ)+JH)) ův Třada v	EGXPO	53
33 J=J+1 B0XP0 55 6_11:32 B0XP0 56 34 JE=JJm P0XP0 57 1F(=LKINEN,11) B0+17533 30 AP0 57 35 JS = JH+1 B0XP0 59 35 JS = JH+1 B0XP0 60 36 JS = I B0XP0 60 37 JN = JS + JE-1 B0XP0 62 37 JN = JS + JE-1 B0XP0 63 37 JN = JS + JE-1 B0XP0 64 JNH=JS + JH-1 B0XP0 65 1F (T1.E0.0) G0 T0 D0 B0XP0 66 0J 47 JS, JN B0XP0 67 0J 47 JS, JN B0XP0 67 0J 47 JS, JN B0XP0 67 0J 47 JS, JN B0XP0 68 0L 45 K= K0,11 B0XP0 68 KL=ML(NEW,K) B0XP0 70 69	JW=JH+1	80XP0	54
34 JE = JL = JR POXPO 57 34 JE = JL = JR POXPO 57 1F (=LRINEN,11) 30.470 50 35 JS = JH+1 BOXPO 50 JSW=1 BOXPO 60 JSW=1 BOXPO 60 36 JS = I BOXPO 62 JSH=JE +1 BOXPO 62 JSH=JE +1 BOXPO 63 37 JN = JS + JE-1 BOXPO 63 JNH=JSH+JH-1 BOXPO 64 JNH=JSH+JH-1 BOXPO 65 IF (TILEO+G) GO TO D) BOXPO 66 UD J 47 J=JS, JN BOXPO 67 GC 45 K=KO, I1 BOXPO 67 KL=ML(NEW,K) BOXPO 69	. +L =L	BUXPU	72
31 JL JL JL 31 JL JL JL JL JL 31 JL JL JL JL JL 31 JL		BOXED	57
35 JS = JH+1 B0XP0 59 JSW=I B0XP0 60 G0 T0 37 B0XP0 61 36 JS = I B0XP0 62 JSH=JE +1 B0XP0 63 37 JN = JS + JE-1 B0XP0 63 JNH=JS + JH-1 B0XP0 64 JNH=JS + JH-1 B0XP0 65 IF (T1.EQ.G) GC T0 50 C SLBTRACTIGN OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH B0XP0 66 DJ 47 J=JS, JN B0XP0 68 GC 45 K=KO, I1 B0XP0 69 KL=ML(NEW,K) B0XP0 70	The first between a state that the state of	30 KP 0	58
JSW=I BOXPO 60 JSW=I BOXPO 61 36 JS =1 BOXPO 62 JSW=JE +1 BOXPO 63 37 JN =JS +JE-1 BOXPO 63 JNH=JSH+JH-1 BOXPO 64 JNH=JSH+JH-1 BOXPO 65 if (JI.EQ.O) GO TO DO BOXPO 66 C SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPO BOXPO 67 BOXPO DJ 47 J=JS, JN BOXPO 68 CC 45 K=KO, I1 BOXPO 69 KL=ML(NEW,K) BOXPO 70	76 15 ± 1943	BUXED	59
G0 T0 37 B0XP0 61 36 JS =1 B0XP0 62 JSH=JE +1 B0XP0 63 37 JN =JS +JE-1 B0XP0 64 JNH=JSH+JH-1 B0XP0 64 IF (J1.E0.0) G0 T0 b0 B0XP0 65 C SUBTRACTION OF CUNTRIBUTIONS OF PRECEDING ROWS TO UPWASH B0XP0 66 D0 47 J=JS, JN B0XP0 67 CC 45 K=K0, I1 B0XP0 69 KL=ML(NEW,K) B0XP0 70	JSW=1	BOXPO	60
36 JS =1 BÓXPO 62 JSH=JE +1 BOXPO 63 37 JN =JS +JE-1 BOXPO 64 JNH=JSH+JH-1 BOXPO 64 IF (JI.EQ.U) GC TO DU BOXPO 65 U SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPO 66 U SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPO 67 DU 47 J=JS, JN BOXPO 68 CC 45 K=KO, I1 BOXPO 69 KL=ML(NEW,K) BOXPO 70	GO TO 37	BOXPO	61
JSW=JE +1 BOXPO 63 37 JN =JS +JE-1 BOXPO 64 JNH=JSH+JH-1 BOXPO 65 IF (JI.EQ.O) GO TO DO BOXPO 66 C SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPO 67 DO 47 J=JS, JN BOXPO 68 CC 45 K=KO, I1 BOXPO 69 KL=ML(NEW,K) BOXPO 70	36 JS =1	BŐXPO	62
37 JN = JS + JE-1 BOXPO 64 JNH= JSH+JH-1 BOXPO 65 IF (JI.EO.O) GO TO DO BOXPO 66 C SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH BOXPO 66 DO 47 J=JS, JN BOXPO 67 GC 45 K=KO, I1 BOXPO 69 . KL=ML(NEW, K) BOXPO 70	JSH=JE +1	BOXPO	63
JNH=JSH+JH-1 IF (J1.EQ.G) GO TO DO C SUBTRACTION OF CUNTRIEUTIONS OF PRECEDING ROWS TO UPWASH DO 47 J=JS, JN CC 45 K=KO, J1 KL=ML(NEW, K) BOXPO	37 JK = JS + JE - 1	BOXPO	-64
1+ (11.E0.0) GU TO 50 BDXPU 66 C SUBTRACTION OF CUNTRIBUTIONS OF PRECEDING ROWS TO UPWASH BDXPO 67 DJ 47 J=JS, JN BDXPO 68 CC 45 K=K0, 11 BDXPO 69 . KL=ML(NEN, K) BDXPO 70		BOXPO	65
U SUBTRACTION OF CONTRIBUTIONS OF PRECEDING ROWS IS OF WASH BOXPO 67 DJ 47 J=JS, JN CC 45 κ=K0, II . KL=ML(NEW, K) BOXPO 70	IF (II.EQ.C) GO TO SU	BUXPU	60
CC 45 K=K0,J1 BOXPO 69 KL=ML(NEN),K) BOXPO 70	U SEBIRALITON DE CONTRIBUTIONS DE PRECEDING RUNS LO UPWASM	5004FU 20720	10 68
. KL=ML(NEW,K) BOXPD 70	Cf. 45 x=⊀0+11	BOXPO	69
	. KL=ML(NE₩,K)	BOXPO	70

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		NZ=JA85(N-J)+1	ROXAG	<u> </u>
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		AZ=A(Z+N1+K1)+A(Z+Z+K1)	80 XPO	77
		JT=1.0	BUXPU	78
		TEAN OF A CANEN TO A THE ACTIVE A CALL AND A HEAD AND A CALL	ROYPO	70
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С		SETTING UP FETRIX	BOXPO	84
-	50		BOXPO	85
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		$N_{c} = 1 \text{ Abs} (J - \kappa) + 1$	ROXMO	88
		HT=1.C	BOXPO	· 89
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С		· · · · ·	BOXPO	91
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		11253961=6822581513842392311781	SUAPU	72
	52	CUNTINUE	BUXPU	96
C		SUBTRACTION OF CONTRIBUTION	BOXPO	97
C		FROM WAKE BOXES S(HING)=	BOXPO	98
C		S[#14G]—T(WAKE)*PHI(WAKE)	80XP0	9.9
		1F(J#.53.0) 5E TO 50	BOXPO	100
		00.55 1=15.15	BOYPD	101
		TO ISS NETRO INS	BOYPO	707
		ビビージャ ハーロコロラロウイ イント・イントービュー イン・ア・ション ふくろうえい ふくさい アイワード おまみでえつ 料 学者	BOYNG	102
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с	56	LONTINUE IF(MLW(NEH,I).LT.) 5511360 RE-POSITION ELEMENTS OF T	BOXPO BOXPO BOXPO BOXPO	104 105 106 107
c	56	LONTINUE IF(MLW(NEH,I).LT.)) 05/13 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE	BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108
c	56	LONTINUE IF(MLW(NEW,I).LT.)) SJ (J 60 REPOSITION ELEMENTS OF T DO 59 N=I.JE NW=N+JW	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109
<u>c</u>	56	LONTINUE IF(MLW(NEN,I).LT.)) 33 (3 60 REPOSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1.JE	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 -110
<u>c</u>	56	LONTINUE IF(HLW(NEH,I).LT.)) 00 (J 60 REPOSITION ELEMENTS OF T NW=N+JH DO 50 J=1,JE MH=J+JH	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 -110 -111
<u>c</u>	5 to 	LONTINUE IF(MLW(NEH,I).LT.)) 00 (J 60 REPOSITION ELEMENTS OF T NW=N+JH DO 50 J=1,JE NH=J+JH DO 58 K=1,2	B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0	104 105 106 107 108 109 109 110 111 112
<u>c</u> 	56 	LONTINUE IF(MLW(NEW,I).LT.); 50 (J 60 REPOSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 58 K=1,2 T(K.J.N)=T(K.Kb,NH)	B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0 B0XP0	104 105 106 107 108 109 109 110 111 112 113
<u>c</u>	56 	LONTINUE IF(MLW(NEW,I).LT.)) 00 (J 60 REPOSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1.JE MH=J+JH D0 58 K=1.2 I(K,J,N)=T(K,NA,NH)	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113
<u>c</u> 	56 	LONTINUE IF(HLW(NEH,I).LT.)) 00 (J 60 REPOSITION ELEMENTS OF T NW=N+JH DO 50 J=I,JE MH=J+JH DO 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 113
<u>с</u> с	56 	LONTINUE IF(HLW(NEH,I).LT.)) 00 (J 60 REPOSITION ELEMENTS OF T DO 59 N=1.JE NW=N+JW DO 50 J=1,JE MW=J+JW DO 58 K=1,2 I(K,J,K)=T(K,Kh,NH) CONTINUE	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115
с с с	56 	LONTINUE IF(MLW(NEH,I).LT.)) 60 (J 60 REPOSITION ELEMENTS OF T DO 59 N=1.JE NW=N+JH DO 50 J=1.JE MW=J+JW DO 58 K=1.2 T(K,J,N)=T(K,MA,NH) CONTINUE SLUTION OF (SULTIONS	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116
с с с	56 	LONTINUE IF(MLW(NEW,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE SLUTION OF (SULTIONS UNTINUE	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 117
с с с с	56 	LONTINUE IF(MLW(NEW,I).LT.)) RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1.JE MH=J+JH D0 58 K=1.2 T(K,J,N)=T(K,MH,NH) CONTINUE SLLUTION OF (SULTIONS U(NTINU:	BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO BOXFO	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118
с 	56 58 	LONTINUE IF(HLW(NEH,I).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1,JE MH=J+JH D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE StLUTION OF (SULTIONS UNTINUE (F(J*ITE.:) 0, T. (.	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
с с с с	56 	LONTINUE IF(HLW(NEH,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JW D0 50 J=1,JE MW=J+JW D0 58 K=1,2 I(K,J,N)=T(K,Kh,NH) CONTINUE SLUTION OF (SULTIONS U(NTINU: If(J+ITE.:) 6. T. 7. MNIT(Le,107) J	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 109 110 111 112 113 114 115 116 117 118 119 120
с 	56 	LONTINUE IF(MLW(NEH,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 58 K=1,2 T(K,J,N)=T(K,MA,NH) CONTINUE SLUTION OF (CL2TIONS CLNTINU: IF(J*ITE.:0) 6. T. 2. MNIF(I+,107) 1 J 70 K=1+2	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 117 118 119 120
с с с с	56 	LONTINUE IF (HLW(NEW,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE StLUTION OF (CU2TIONS CONTINUE IF (J <ite.t) 6.="" 7.<br="" t.="">MNITF (I+,107) I J 70 K=1.2 NIEN</ite.t)>	B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 120
<u>с</u> с с	56 	LONTINUE IF(HLW(NEH,I).LT.D) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1,JE MH=J+JH D0 58 K=1,2 T(K,J,N)=T(K,Mh,NH) CONTINUE StLUTION OF (CU2TIONS CUNTINUE IF(J+ITE.t.o) 0. T. 7. MNIF(I+,107) I J'70 K=1+2 NI=1 CONTACT	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 116 117 118 119 120 121 122
<u>с</u> с с	56 	LONTINUE IF (HLW(NEW,I).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JW D0 50 J=1,JE MW=J+JW D0 58 K=1,2 I(K,J,K)=T(K,MA,NH) CONTINUE SLUTION OF (CL2TIONS C(NTINU: If (J*ITE.:) 6. T. 7. MNITF (I+107) I J'70 K=1.2 NI=1 K2=M1+3	BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO BOXPO	104 105 106 107 109 110 111 112 113 114 115 114 115 116 117 120 121 122 123
с с с с	56 58 59 51	LONTINUE IF (HLW(NEH,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1,JE NH=J+JH D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE SLUTION OF (SULTIONS U(NTINU: IF (J*ITE.:0) 6. T. 7. WN IF (I+,1C7) I J' 70 K=1.2 NI=1 K_Z=M1+3 . C. 7 J=.,Jr	B0XP0 B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 117 118 117 118 122 123 124
с с с с	56 	LONTINUE IF(MLW(NEW,T).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NH=N+JH D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE StLUTION OF (CULTIONS UNTINUE IF(J+IFE.t) 6. T. 7. MNIF(I+,107) I J'70 K=1.2 NI=1 K_2=M1+3 C = 7 J=1.J, MNIF(I+,105) (J,N,1(+,J,N)+N=N1+N2)	BOXPO BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 117 120 120 121 123 124 123 124 125
<u>с</u> с с	56 	LONTINUE IF(HLW(NEW,I).LT.D) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JW D0 50 J=1,JE MH=J+JW D0 58 K=1,2 T(K,J,N)=T(K,Mh,NH) CONTINUE StLUTION OF (CU2TIONS CONTINUE IF(J*ITE.t=.0) 0. To 2. MNIF(I+,107) I J'70 K=1+2 NI=1 K2=M1+3 C 57 J=1,J, MNIF(IM,104) (J,N,1(+,J,N)+N=N1+N2) IF(N-,01+J2) v(IM)	BOXPO	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 122 122 124 125 126
<u>с</u> с с	50 58 59	LONTINUE IF (HLW(NEW,I).LT.D) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JW D0 50 J=1,JE MH=J+JW D0 58 K=1,2 I(K,J,K)=T(K,MA,NH) CONTINUE StLUTION OF (CU2TIONS CONTINUE IF (JKITE.t=.0) 65 T. 7. MNITF (I+,107) I J'70 K=1+2 N1=1 K2=M1+3 C 57 J=1,J MITCIM, 104 (J,N,1(+,1,N),N=N1,N2) IF (M,104) (J,N,1(+,1,N),N=N1,N2) IF (M,1(M,1(N),N) (J,N,1(+,1,N),N) IF (M,1(M,1(N),N) (J,N,1(+,1,N),N) (J,N) (J,N) (J,N) (J	B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 123 124 125 126 127
<u>с</u> с с	50 58 59	LONTINUE IF (HLW(NEW,T).LT.D) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JW D0 58 J=1,JE MW=J+JW D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE SLUTION OF (SULTIONS U(NTINU: IF (JKITE.t) 65 TO 7 MN IF (IA,107) I J'70 K=1.2 N1=1 N2=M1+3 .C ST J=1,J; MENDALSSON (J,N,1(1,J,N),N=N1,N2) IF (N,105) (J,N,1(J	B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 117 118 117 118 122 123 124 125 126 127 128
с с с с	50 53 59	LONTINUE IF(HLW(NEH,I).LT.D) GJ (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N-JH D0 50 J=1.JE MW=J+JW D0 58 K=1,2 T(K,J,N)=T(K,Kh,NH) CONTINUE SLUTION OF (CLATIONS CONTINUE SLUTION OF (CLATIONS CONTINUE IF(J*ITE.t.+C) C_T. 7. MNITF(I+,1C7) I J'70 K=1.2 N1=1 Carity J-1, J, N, N=N1,N2) IF(N=.ct.J) C_T. 7. MNITE(IM,1C9) (J,N,1(+,J,N)+N=N1,N2) IF(N=.ct.J) C_T. 7. MITE(IM,1C9) (J,N,1(+,J,N)+N=N1,N2) IF(N=.ct.J) C_T. 7. MITE(IM,1C,N) C_T. 7. MI	B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 1221 1221 1223 124 125 126 127 128 129 129 120 120 120 120 120 120 120 120
c c c c	50 58 59 50 50	LONTINUE IF (HLW(NEM,I).LT.)) GU (J 60 RE-POSITION ELEMENTS OF T DU 59 N=1.JE NW=N+J4 DU 50 J=1.JE MW=J+JW DU 58 K=1.2 I(K,JA,K)=I(K,Kh,NH) CONTINUE StLUTION OF (CLATIONS CLATINUE If (JAITE.t) 0. T. 7. NN IT (IA.107) I J'70 K=1.2 N1=1 N_2=M1+3 C T J=.J' N=N1+3 If (JAITE.t.) 0. T. 7. NIT (IW, 104) (J,N,114,J,N)+N=N1,N2) If (M. 04) (J,N,114,J,N)+N=N1,N2)	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 122 123 124 125 126 127 128 129 129</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 122 123 124 125 126 127 128 129 129
c c c c	50 58 59	LONTINUE IF (MLW(NE*;I).LT.)) 63 (j 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1.JE MH=J+JH D0 58 K=1,2 T(K+J+N)=T(K+N+NH) CONTINUE StLUTION OF (CULTIONS) StLUTION OF (CULTIONS) StLUTION OF (CULTIONS) NEXT NEXT NEXT NEXT NEXT StLUTION NEXT STATION STATION	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 113 114 115 116 117 122 123 124 125 126 127 128 129 130</td>	104 105 106 107 108 109 110 111 112 113 114 113 114 115 116 117 122 123 124 125 126 127 128 129 130
<u>с</u> с с	50 58 59	LONTINUE IF (MLW(NE+,T).LT.)) G0 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NW=N+JH D0 50 J=1,JE MH=J+JW D0 58 K=1.2 T(K,J,N)=T(K,PK,NH) CONTINUE SLUTION OF (CL2TIONS CLNTING: IF (J*ITE.to) 60 T. 7. MNIF(1+,1c7) I J'70 K=1.2 NI=1 K_2=*1+3 C T J=.,J; MNIF(I+,1c7) (J,N,T(+,J,N)+N=N1,N2) IF (N_2,ct.JL) V(IV - NI=2) I N_=NI+3 (I T D N C(NTIN):5 '(69 J=1,JE	B0XP0 B0XP0 </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 121 123 124 125 126 127 128 129 130 131</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 121 123 124 125 126 127 128 129 130 131
<u>с</u> с с	50 53 59	LONTINUE IF(MLW(NEw;I).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NM=N+JW D0 58 K=1.2 T(K_J=N)=T(K_FK=NH) CONTINUE SULUTION OF (CLATIONS CONTINUE SULUTION OF (CLATIONS CONTINUE IF(J=(IFE.t=.0) 0. To 7. MNIT(I=.t=7) I J' 70 K=1.2 NI=1 A_Z=M1+3 C Z J=.JF NI=1 N_=NI+3 C T T NC IF(N_1CY) (J,N,I(+,J,N),N=N1,NZ) IF(N_1CY) (J,N,I(+,J,N),NZ) IF(N_1CY) (J,N,I(+,J,N),NZ) IF	B0XP0	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 1221 1223 124 125 126 127 128 129 120 121 1223 124 125 126 127 128 129 120 121 1223 124 125 126 127 128 129 120 121 120 121 1223 124 125 126 127 128 129 120 120 121 123 124 125 126 127 128 129 120 120 120 120 120 120 120 120
<u>с</u> с с	56 58 59	LONTINUE IF(MLW(NEw;I).LT.)) 60 (J 60 RE-POSITION ELEMENTS OF T RE-POSITION ELEMENTS OF T RE-POSITION ELEMENTS OF T RE-POSITION ELEMENTS OF T MW=J+JW D0 58 J=1,JE MW=J+JW D0 58 K=1,2 I(K,J+N)=I(K,Kh,NH) CONTINUE SILUTION OF (CL2TIONS CONTINUE If (J+IE::) 0. T. 7. *KIT*(I+,LT) I J' 70 K=1.2 N1=1 Continue If (J+IE::) 0. T. 7. *Line If (J+IE::) 0. T. 7.	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 122 122 122 124 125 126 127 128 129 129 130 131 132 133</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 122 122 122 124 125 126 127 128 129 129 130 131 132 133
C C C C	56 58 59	LONTINUE IF(MLW(NEM,T).LT.)) GJ (J 60 RE-POSITION ELEMENTS OF T D0 50 N=1.JE NM=N+JM D0 50 J=1.JE MW=J+JW D0 58 K=1,2 T(K+J+N)=T(K+M+NH) CONTINUE StLUTION OF COLATIONS U(NTINUE If (J*ITE.t0) GD T.N 7 MKIT! (I+:LC1) I N' 70 K=1.42 NI=1 Nc=n!+3 C 67 J=Jr MA=IN(IM,IC1) (J,N,I(+,J,N)+N=N1,N2) If (M2	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 132 133 134</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 132 133 134
<u>с</u> с с	50 58 59	LONTINUE IF (MLW(NEM,T).LT.)) GG (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NN=N+JM D0 53 J=1.JE NW=J+M D0 58 K=1,2 T(K,J,H)=T(K,HA,NH) CONTINUE StLUTION OF CLETIONS U(NTINUE StLUTION OF CLETIONS StLUTION OF CLETIONS U(NTINUE StLUTION OF CLETIONS U(NTINUE StLUTION OF CLETIONS U(NTINUE NINTON U(NTINUE U(NTINUE U(NTINUE U(NTINUE U(NTI	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 121 123 124 125 126 127 128 129 130 131 132 131 132 131 132 131 134</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 121 123 124 125 126 127 128 129 130 131 132 131 132 131 132 131 134
<u>с</u> с с	50 58 59	CONTINUE IF(MLW(NE*;I).LT.)) GJ (J 60 RE-POSITION ELEMENTS OF T D0 59 N=I.JE NN=N+JH D0 53 J=I.JE NH=J+JH D0 58 K=1,2 I(k,J,N)=T(K,M%,NH) CONTINUE StLUTION OF (QLATIONS) US TINU: If (J=167) I J' 70 X=1-2 N1=1 V_C=NI+3 St T J=.J MITE(IM:105) (J,0.1(+,J,N)+N=N1,NZ) If (N=105) (J,0.1(+,J,N)+N=N1,NZ)	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 126 127 130 131 132 133 135 136</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 126 127 130 131 132 133 135 136
<u>с</u> с с	56 58 59	LONTINUE IF(MLW(NEw;T).LT.)) GJ (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NN=N+JH D0 53 J=1.JE NH=J+JH D0 58 K=1.2 T(K,J,N)=T(K,Kh,NH) CONTINUE Stiution OF (cuttions) cutrinut If (defife.t=.ou) GJ T. 7. whitf(le.te.t) GJ T. 7. whitf(le.te.t.) GJ T. 7. T. 6.	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 112 113 114 115 116 117 120 121 122 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137</td>	104 105 106 107 108 109 110 112 113 114 115 116 117 120 121 122 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137
C C C C	56 58 59	LONTINUE IF (MLW(NEw;T).LT.)) 65 (j 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NN=N+JM D0 53 J=1.JE NN=N+JM D0 58 K=1,2 T(K,J,N)=T(K,K*NM) CONTINUE StLUTION OF (CLATIONS CONTINUE StLUTION OF (CLATIONS CSTINUE If (J=1L27) I N=N+JK (IM-LOS) (J=N,1(+,J,N)+N=N1,N2) If (A:.uc.JL) (CLATIONS CSTINUE StLUTION OF (CLATIONS CSTINUE If (J=1L27) I N=70 K=1.20 N=11 N=2+1 N=N+3 StITTON CNTINUE C	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138
<u>с</u> с с	50 58 59	CONTINUE IF (MLW(NE+,T).LT.)) G0 (J 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NN=N+JH D0 50 J=1,JE NN=N+JH D0 58 K=1,2 T(K,J,H)=T(K,PH,NH) CONTINUE Stlution Stlution If (J*ITE.:=u) 0, T. 2. MAIF (I++L07) 1 J' 70 K=1.2 Ni=1 H Kalf (I++L07) 1 J' 70 K=1.2 Ni=1 Kalf (I++L07) 1 J' 70 K=1.4 Kalf (I++L07) 1 Ni=1 Kalf (I++L07) 1	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139
<u>с</u> с с	50 58 59 59	CONTINUE IF (MEW(NE+,T).LT.)) 60 (j 60 RE-POSITION ELEMENTS OF T D0 59 N=1.JE NM=N+JM D0 50 J=1,JE MM=J+JW D0 50 K=1.2 T(K,J,M)=T(K,Fh,NH) CONTINUE CONTINUE StLUTION OF SULFTIONS ULNTINUE If (J=11E.S) 60 To 7. MAITY (I+,107) I J 70 K=1.2 N1=1 N2=M1+3 St St ULTION (J,N,T(+,J,N),N=N1,N2) If (N=0.00000000000000000000000000000000000	BOXPO BOXPO </td <td>104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140</td>	104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140

ORIGINAL PAGE IN OF POOR QUALITY

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c				BOXPO	141
-		K = MSIMEC(Mealelelelelelelele		BOXPO	142
		1F4K.WE.1)- GU TC +5		BÖXPO	143
С		CONPUTE WAKE POTENT	LALS	BOXPO	144
Ċ		PHI(TE)+EXP(-IK+(X-)	(TE))	BOXPO	145 .
•••		IF(X.LE. (ARI-E)) up To 35		BOXPO	146
		12=1		BOXPO	147
	75	¥=¥Y(JS)		BOXPO	148
		IF (X.LT. (XTE(NER, JS)-DH)) GO TO 82		BOXPO	149
		IF(x.GE.(XTE(NEW,JS)+OH)) GO TG 82		80XP0	150
		IF(X.GT.XTE(NEW, JSJ) GD TO 76	• •	BOXPO	151
		rTR=S(1,JS,I)		80XPQ	152
-	•	PT1=S(2,J5,1)		BOXPO	153
		KK=1 .		BOXPO	154
		xB=X+D		BOXPO	155
		GU TO 77		BOXPO	156
	76	P=(X-XTE(NEH,JS))/D		BÔXPO	157
		PTR=(1.0-P)*S(1,JS,I)+P*S(1,JS,I-1)		80XP0	158
		PTI=(1.0-P)+S(2,JS,I)+P+S(2,JS,I-1)		BOXPO	159
		KK=0		BOXPO	160
		xe=x	• • •	BOXPO	161
	-77	CONTINUE		BOXPO	162
	80	IF(XB.GT.1.0) GO TO 82		BOXPO	163
		XW=(XB-XTE(NEh,JS})+CK		BOXPO	164
		IKW=1+KK		BOXPO	165
		S(1,JS,IKH)=PTR+COS(XH)+PTI+SIN(XH)		BOXPO	166
-		S(2+JS+IKW)=PTI+COS(X+)-PTR+SIN(XW)		BOXPO	167
		KK=Kx +1		BOXPO	168
		XB=XB+D		BOXPO	169
		GO TO 80 · · · · · · · · · · · · · · · · · ·		BOXPO	170
	82	15=JS+1		BOXPO	171
	-	IF(JS.LE.JL) GO TO 75		BOXPO	172
	85	CONTINUE		BOXPO	173
	90	11=[1+]		BOXPO	174
		RETURN		BOXPO	175
	95	WRITE (IH,140)		BOXPO	176
		STOP		BOXPO	177
	100	FERMAT(1H1,2CX,42HINFLUENCE CBEFFICIENT (REAL AND IMAGINA	21///1	BOXPO	178
	110	FORMATCING, 34, 13, 304-31X SEPARATION IN CHORDWISE DIRECTION	43	BOXPO	179
	120	F0KHAT(1H ,5x,4(14,1P2L13.0))		BOXPO	180
	140	FORMATCINCLOX,59HSCLUTION OF SIMULTANEOUS EQUATIONS FOR TH	IE POTENT	BOXPO	181
	1	IIAL FAILED)		BOXPO	182
		ENL		BOXPO	183

	SUBROUTINE FORCIARLERY SASEDE TROVISEDMALLER RESEARCE		
	1 ARAY JUAN SILL TELEVIEW, MONTO AND	a second and	
	DINENSION HLT(2.2.NB) XLE12 MBI XTE(2.NBI-XXINBI-STANDIS		
	2 • SEDX (NO - NO - SED (() - A + C + C + C + C + C + C + C + C + C +		miant in
e.	Had the second se		
C.	MO SMORTHING IN SUBRATIES SHOUTH (SPLN2)	STEW TI	
ç			
	AH2=1.0	-Fact	11
	NZ=KSF0(H2)	FONCT	12
	IF (KSFD(M21.EQ.O.AND.NEW.EQ.2) MZ=KSFS	FIREL	13
	08 150 J=1+JHAK	297.61	
		CRACT	1%
		FOREL	17
	K1=1	FORCI	1.8
	K2=4 ·	FORCI	19
	KČ=0	FORCI	20
	T(1,1)=XTE(NE¥,J)	FORCI	21
	40 KK=MLT1	FORCI	
	[[] { / = XLE(NEW, J]	FORCI	23 24
×-•	11 19R/J=U+U	FORCT	
	₩₩₩ ₩	FORCI	26
	IF (K1.EQ.3.0R-NZ.EQ.2) GO TO 45	FORCI	27
	IF(KC.EQ.2) G0 T0 45	FORCI	28
С	EXCLUDE LEADING EDGE POINT IF IT IS TOO CLOSE TO FIRST BOX	FORCI	29
	IF(XX(KK)-XLE(NEW,J).GT.0.2+D) GO TO 45	FORCI	30
	KA=1	FURCI	31
		FUNCI	
	RU=1 AS FONTINHE	FORCE	34-
		FORCI	35
	$T(K_{1}, 2) = XX(KK)$	FORCI	36
	IF(K1.E0.3) GC TO 50	FORCI	37
	T(K,K2)=S(K1,J,KK)	FORCI	38
	IF(NEW.EQ.1.0R.K1.EQ.1) GO TO 50	FORCI	39
-	T(K,12)=AHA(J,KK,NEH)	FURCI	40
	50 KK=KK+1 1 ELVC EO 21 CC TO 51	FUNCI	42
•		FORCI	43
	CALL SPLN1(1,T(1,1),T(1,8),T(1,9),KB,T(1,2),T(1,K2),T(1,10),N)	FORCI	44
	T(NG,KZ) = T(1,e)	FORCI	45
	IF(KC.NE.1) GE TO 51	FORCI	46
	KC=2	FORCI	47
	GO TO 40	FORCI	48
~	51 CONTINUE	FURCI	4 9 50
<u> </u>	TEINT CT 21 CO TO 52	FORCI	51
c	ADJUSTMENT FOR TRAILING EDGE VELOCITY POTENTIAL	FORCI	52
*	KK=HLT(NEW,2,J)	FORCI	53
_	DUM=SORT((XTE(NEW,J)-XLE(NEW,J))/(XX(KK)-XLE(NEW,J)))	FORCI	54
-	T(NQ,K2)=DUH+T(NZ,K2)	FORCI	55
	52 CONTINUE	FORCI	56
¢		+URCI	, <u>57</u>
	RU÷U 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 -	FUKLI	50 50
•	1+(K1-tQ-2) 60 10 55	FURCI	· <u>></u>
	⊼1=C ¥ 2=6	FURLI FOPCT	00 fa
•	GO TO 40	FURCT	62
	55 K1=3	FORCI	63
	CO TO 40	FORCI	64
	60 T(NQ, 2)=XTE(NEW,J)	FORCI	65
	T(NQ, 12)=CTE(J)	FORCT	66
	T(1,12)≠1.0	FURCI	67
ç	IFIABOLALEINERTJI"AANTLIIJI.61.1.8E-001 GU TU 67 TEADING EDGE AND EIRST BOY COINCIDE	FURCI	00 94
¢.	N7=N7=1	FORCI	70

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.

		N0=N0-1	FORCI	71
		DD 55·K=2,NO	FORCI	72
		$1(K_{2}, 2) = 1(K+1, 2)$	FORCI	73
	•	11K9 97=11K+19 93	FORCI	-74
			FURCI	7.5
		IFINE#+EW+11 60 10 07	FURCI	76
	65		PORCI	
	67		FUKGI	70
С			- ENDET	
č		INTERPOLATE DEFLECTION AT BOX CENTER. (FADING AND TRATING FORES	FORCE	*1
		CALL SURFZ(YY(J) -1 (1, 2) -1, NO.2 -1(1, 13) -1(1, 14) - DUM - SEDX(1, NZ)	FORCT	82
		\$ >SFDY(1, M2, NEW), SFDH(1, M2, NEW), MZ, 2)	FORCI	83
Ĉ		PERFORM CHORDWISE INTEGRATION	FORCI	84
		00 75 K=1,NG	FORCI	85
		IF (NEW. EQ. 2) 7A2=T(K, 12) +T(K, 12)	FORCI	86
		T(K,15)=(T(K,14)+T(K,4)+CK+T(K,13)+T(K,6))/AH2	FORCI	87
	75	t(K,16)=(t(K,14)*t(K,6)-CK*t(K,13)*t(K,4))/AH2	FORCI	88
		CALL INTGL(T(1,2),T(1,15),T(J,17),T(J,18),T(1,19),2,NQ,NZ,NN)	FORCI	89
		IF (NEW.ED.2) AM2=CTE(J) *CTE(J)	FURCI	90
			FORCI	<u>91</u> `
		1 (J) 1/) = 1 (NG) 4 F (D) (A - [(J) 1/)	FORCI	.92
	150		FURCI	93
c	100	DEDERDM SPANNISE INTEGRATION	FUKLI	94
		NOEJHAK+2	FURCI	97
		K1=17	FURU1 ERDC1	90
~		KZ*15	FORCE	
		T(1+1)=0.0	FORCI	99
	165	D0 170 K=1, JNAK	FORCI	100
	170	T{K, 2}=YY(K}	FORCI	101
·		N2 = JHAK	FORCI	102
		CALL_SPLN1(1,1),1),1(1,8),7(1,9),NZ,7(1,2),7(1,K1),7(1,10),N)	FORCI	103
		T(NQ, K2)=0.0	FORCI	104
	_	T(1,K2)=T(1,0)	FORCI	105
		UU 1/5 K±1, JMAK	FORCI	106
	113		FORCI	107
		1777.4.50.409 60 10 100 VI-16	FURCI	108
		K2=16	FURLI	109
		60 TO 165	FURLI	111
	180	CONTINUE	FANCT	-112
		NZ=JHAK+1	FORCT	113
		T(1,2)=0.0	FORCE	TIT
		T(NO32)=YHAX(NEN),	FORCI	115
	·— ·	DE 155 K=1.JMAK	FARCT	116
	145	T(K+1)(2) = YY(K)	FORCI	" îî7
C		AING TIP CORRECTION	FORCI	118
		κ1=0	FORCI	119
		xt=T(b3,_)-T(b2-1,_)	FORCI	120
		PK=T(N2-1+10)	FORCI	121
		Pl=T(NZ+1,1c)	FORCI	122
		IF(T(NZ+2)++>+L+LT+T(NU+2)) GD TU 195	FORCI	123
	TAC	$DOP = Six T([T(N(s_2) + T(N(z_12))/XD])$	FORCI	124 .
			FURCI	125
			FURGI	120
	1 45	ICIVALE-+1) OC 10 170 ILIVALE-+1) OC 10 170 ILIVALEMALA, SECTE VERVISCULT 70 101	FUKLI	124
	1.42		FORCE	129
		N7=N2+1	FORCT	130
		ru=hu+1	FORCI	131
		$T(NQ_{1}2) = T(NL - I_{1}2)$	FORCI	132
		T(N2,2)=T(N2-1,2)+0	FORCI	133
		T(n3+10)=T(NC+1+10)	FORCI	134
		Ť(N3,16)=Ť(NJ-1,16)	FORCI	135
		UC 1, 140	FORCI	136
	176	LUNIINUL	FORCI	137
		1+1A35111+4+2+=1(N2+2+).62.1.2-05) GB TO 197	FURCI	138
		NC = NO = 1	C () (/ *	
		NG=NO-1 N/=t/2-1	FORCI	139

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$T(NJ_{2}, 2) = T(NU+1, 2)$				FORCI	14
$T(NO_{2}17)=T(NO+1_{2}17)$				FORCI	14
T(Nu+1+)=T(Nu+1+1+)			,	FORCI	14
197 CLATING:				FORCI	14
ί · · ·			•	FORCI	14
CALL INTGL(T(1,2),T(1	,15),T(1,1),T(2,)	11, 111, 191, 2,1	NO, NZ, NM}	FORCE	1.
KETUAN		····		FORCT	T
ENC			.'	FORCI	14

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	•	SUBROUTINE HRED(DA,T,H,H,NB,KSFH,SFHX,SFHY,SFHH,IH,IPRINT)	MRED	2
C		SPLINE-SURFACE FIT OF MACH NUMBER	NRED	3
		DIMENSION DA(1),T(NH,1),SFNX(1),SFNY(1),SENH(1)	MRED	4
• -		CONST = 0 - 28571429	HRED	5
		K5FN=DA(97)	HRED	6
		IF (KSFH) 80,5C,10	HRED	7
C			HRED	Я
Ċ		FITTING OF GIVEN PRESSURE/MACH TO A SPLINE-SURFACE	HRED	ŏ
: C			NEED	10
!	10	1F(NB-KSEH) 8C.15.15	MPED	11
	15	CONTINUE	HPED	17
		KP = 701	MPED	12
		06 30 IP=1.KSFM	NEED	14
		SENX(IP)=DA(KP) 1/3A(24)	NDCO	16
		SERVID = BA(x F + 1)/(A(2A)		1.5
		SEMH(TP)=0A(KP+2)	SKED MRCO	10
r		AA49A == 1 - ROOT BAT, NOT DESCRICE FREETFENT		17
- č		DA = (0, 1, 2) There is a standard transformed to the standard	HARD	18
Ŷ		TETRATORIET AN TALANCE LOCAL MACH NUMBER		19
r		TO NEET BEST D. TO TO TO TO TO TO TATE AND A PROVIDENT	NKEU UKED	20
L.	20	CENTERS PRESSURE GEFFELERAL INTO LUCAL AALD NUMBER	MKED	21
	20	2.004161614206162544755146714425142161144608211-1913	MRED	22
	27		RKED	23
~	30		MRED	24
Ļ		SPLINE SURFACE FILLING OF GALA	MRED	25
	49.		MRED	26
		IF LIPKINI.NELLI AKIJE [INJID]	HRED	27
		LALL SURFIINNSKSFT, I, SFRX, SFRY, SFRH, IPRINT)	HRED	28
		KE TUK N	HRED	29
<u> </u>			HRED	30
́С,		PRESENTLY INPUT OF PRESSUPE COEFFICIENT IN	MRED	31
្ល		A PULYNOFIAL FORM IS NUT ALLOWED	MRED	32
C		THE FOLLOWING IS FOR MACH INPUT AS A POLYNOMIAL HEAD+ATEX	HRED.	33
	50	CONTINUE	NRED	34
		kSFH=0	ARED	- 35
		SFHH(1)=DA(71)	HRED	36
		SFRH(2)=DA(72)#CA(24)	HRED	· 37
		SFRH(3)=0.0	MRED	38
		GO 19 40	HRED	- 39
C			MRED	40
	75	TPR=90	ARED	41
		GO TU 85	HRED	42
	06	IPF=97	HRED'	43
	85	HRITE	MRED	44
	C	TIN, IIOJIPR	MRED	45
		STOP	MRED	46
	100	FORMAT(1H0,10x,73HC04PUTED HACH(X,Y) = A0+A1+X+A2+Y+ SDN HF HITTH	"HRED"	
	5	(R(1)*+2)*(ALGG(R(1)*+2))	MRED	48
	110~	FORMAT(1H0,10X,14HMRED-6AD DATA,151	WRED	
		END	HRED	50
				<u> </u>

	SUBRDUTINE INTEL(X,Y,Y,VX,VI,S,N,NQ+NZ,NM)	INTGL	2
-ĉ	INTEGRATION BASED ON SPLINE FUNCTION	INTGE	3
•	DIMENSIUN X(1) (NM,2) (S(NM,1)	INTGL	4
3	DEFINE L(J)	INTGL	5
	DD 20 1=2+NG	INTGL	6
-	20 S(1 + 1) + X(1) - X(1 - 1)	INTGL	7
	1F (NG_EG.2) G6 T0 50	INTGL	8
Ĉ	DEFINE TRI-CLAGONAL COEFFICIENT MATRIX	INTGL	- 9
1	DO 25 1=2,N2	INTGL	10
· '	<u>S(1,2)</u> S(1,1)/0.0	INTGL	11
	$S(I_{+3}) = (S(I_{+1}) + S(I_{+1}) + 1) + 3 \cdot 0$	INTGL	12
	$25 \ S(1,4) = S(1+1,1)/5.0$	INTGL	13
i	S(2,2)=0.0	INTGL	14
	S(NZ-4)=0.0	INTGL	15
C	DEFINE RIGHT-FAND-SIDE LOLUMN MATRIX	INTGL	16
-	<u>K=1</u>	INTGL	17
	35 DD 40 I=2,NG '	INTGL	18
! -	40 S(I,5)={Y(I,x}-Y(1-1,K))/S(1,1)	INTGL	19
:	D0 45 I=2, NZ	INTGL	20
·	45 5(1,6)= 5(1+1,5)-5(1,5)	'INTGL	21
С	SOLVE FOR CCEFFICIENTS OF SPLINE FUNCTION M(J)	INTGL	22
	CALL TRIDI(2, NZ, S(1,2), 3(1,3), 5(1,4), 5(1,6), 5(1,7), 5(1,8), 5(1,9))	INTGL	23
	50 CONTINUE	INTGL	24
	5(1,7)=0.0	INTGL	25
	S (Na, 7)=0.0	INTGL	26
	VI=0.0	INTGL	-27
	DG 60 1=Z+NG	INTGL	28
	VI=V1+0.5+5(1,1)	INTGL	29
	\$ \$\$\Y{I;K}+Y{I-1;K}-\${I;1}+\${I;1}*\${I;1}*{S{I;7}}+\${I-1;7}}/12*}	INTGL	30
	60 CONTINUE	INTGL	31
	IF(K:EJ.2) KETURN	INTGL	° 32
	VK=VI	INTGL -	33
	IF(N.EG.1) RÉTURN	INTGL	34
	- K ∓2 -	INTGL	35
	GO TO 37	INTGL	36
	END	INTGE	37
	-		

SUBROUTINE TRIDI(K1,K3,A,8,C,D,V,E,F)		I TOLA	2
DIMENSION A(1),8(1),C(1),D(1),V(1),E(1),	F(1)	财政。	3
IF \$K3.NE.K11. 60 TO 5		R101	
V(#3)=D(#3)/8(#3)		RIOL	
RETURN	1		
5 CONTINUE			
E(#23+8(#1)		R191	
F1E5729(K1)/E1K1)	······································	ARIOT.	9
R2-K1+1		#101-	- <u>(</u>
60 IQ:I=R2.K3	<u>.</u>	RADE	11
E(1348(1)-A(1)+C(1-1)/E(1-1)	1	RIÐI	- 12
0 F(1)=(D(1)-A(1)*F(1-1))/E(1)		RIDE	13
¥(X3)=F(K3)	* * 1	RIDE	- 14
K2+K3-K1		RIOI	.15
00 20 J=1-K2	· • •	RÍÐI	_ 1 6
1=K3=J-	· · · · · · · · · · · · · · · · · · ·	RIOL .	- 19
20 V(11+F(1+-C(1++)/E(1)	. 1	RIDE	18
RETURN		RIDI	19
ENÐ		RIDI	20

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	SUBRBUTINE SPLNI(NI+X+Y+DY+N+X++YY+DYY+NSHOS)	SPLNI	2
C	. X,Y, DY=INTERPELATION INDEPENDENT, DEPENDENT VARIABLES, AND DY/DX	SPLN1	3
C	NI	SPENI	4
Ĉ	XX TX = INPUT INDEPENDENT AND DEPENDENT VARIABLES /	SPLN1	5
C	N =NG. OF INFUT PUTATS	SPLN1	6
C	DYY =U(YY)/C(XX) FOR INPUT DATA	SPENI	7
С	NSHOS -CUNTRULS OF JHOJTHING AND PRE-INTERPOLATION	SPLN1	- 8
	DIMENSION X(1), Y(1), DY(1), XX(1), YY(1), DYY(1)	SPENI	9
	N2=N	SPLNI	10
r	IPRE=NSHOS/10	SPLNI	11
	NSAC=NSAJS-IPxt+1)	SPLNI	12
~	IF(IPAC.LL.L) 60 TO 30	SPLN1	13
C	STOKE INPUT DATA FOR PRE-INTERPOLATION	SPLNJ	14
		SPENI	15
	(L)×X={L}Y	SPLN1	16
	2G DY(J)=YY(J)	SPENI	17
•	CALL SPISETIN,XX,TY,UYY,0+0+0)	SPLN1	18
C	PRÉ-INTÈRPULATION	SPL'N1	19
	DC 23 1=2+N	SPLNI	20
	$\overline{1}$ $1 = \overline{1} + \overline{1} - \overline{2}$	SPLNI	21
•	12=11+1	SPLN1	22
	xx{i2}=Y{I}	SPLNI	23
	¥¥(12)=J¥(1)	SPLNI	24
	Xx(11)=0.0+(Y([-1)+Y(1))	SPLN1	25
	25 LALE SPLN2(72(11),1,14,7,27,577,477(11),344,1)	SPLN1	~26
	N2=2+1-1	SPLN1	27
	36 CENTINO:	SPENI	28
	IF(NSMC.+6.) 68 To 4) -	SPLN1	29
́.С	SHOOTH INPUT DATA AXA YY	SPLN1	30
•	LALL SHEQTH(H2,+X,YY+7,NSHO)	SPLN1	31
ũ	INTERPOLATE Y AT A PRIMINE, YY, DYY AND CALCULATE DY=D(Y)/D(X)	SPLN1_	32
	40 CALL SPISET TY STY STY SOUL	SPLN1	33
	CALL SPINZERSHINC + KAFYY + DYY + Y + UY + 2)	SPLNI	34
	RETURN	SPLN1	35
	END	SPLN1	36

SUBROUTINE SPLNZ(XP,NP,N,X,Y,D,SPF,SPD,K)	SPLHZ
DIMENSION X(1), Y(1), D(1), XP(1), SPF(1), SPD(1)	SPLHZ
EVALUATES A NATURAL CUBIC SPLINE AND ITS FIRST DERIVATIVE U	ISING SPENZ
SLOPE ARRAY D CALCULATED BY SPISET AND USING THE INPUT DATA	SPLN2
ARRAYS X AND Y	SPLN2:
DO 10 J=1+NP	SPLNZ
IF(xP(J).LT.X(1).0R.N.EQ.1) GO TO 6	5P <u>LN2</u>
D0 2 1=2,N	SPLNZ
IF(XP(J)-LT-X(I)) GO TO 4	SPLHZ
2 CONTINUE	SPENZ
56£{7}=Å{N}+C{H}+C{T}-X{H}}	SPLNZ
1F(K.EQ.1) 60 TO 10	SPLNZ
SPD(J)=D(N)	SPENZ
<u>GC TO 10</u> .	SPLNZ
4 C1=1./(X(I)-X(I-1))	SPENZ
C2=X(1)-XP(J)	SPLNZ
C3=XP(J)-X(I-1)	SPLNZ
C4=C2+C1	SPENZ
C5=C3+C1	SPLN2
SPF(J)=C5*C5*(1.+2.*C4)*Y(1)-C2*D(1))	SPEN2
\$ +C4*C4*(12.+2.*C5)*Y(I-1)+C3*D(I-1)}	SPLN2
IF (K.E.G.1) GO TO 10	SPLNZ
C6=2.+C2-C3	SPLNZ
C7=2.+C3-C2	SPLNZ
SPD(J)=C1+(C3+(2.+(1.+C1+C6)+Y(I)-C6+D(I))	SPLN2
\$ -C2*(2.*(1.*C1*C7)*Y(1-1)+C7*D(1-1))	SPLN2
6D TU 10	SPEN2
6 SPF73)=Y(1)-D(1)+(x(1)-XP(3))	SPENZ
IF(K_EC.1) GO TO 10	SPLN2
5P0(J)=0(1)	SPENZ
10 CUNTINUE	SPLNZ
RETURN	SPENZ
FND -	SPÉ N2

	• • • • • • • • •	_
SUBROUTINE SPISET(NyXyY, DyRMS, IFRMS)	SPISET	2
DIMENSION X(1),Y(1),D(1)	SPISET	·
DATA JHAX, RO, H/20, 16666667, 1.07179677/	SPISET	<u> </u>
D(1)=0.	SPISET	5
IF(N.EQ.1) RETURN	SPISET	<u> </u>
D(N)=0.	SPISEI	7
AN=n	SPASET	
DO 1 II=2,N	SPISET	9
I=N+2-11	SPISEI	-10
x(I)=x(I)-x(I-1)	SPISET	11
1 Y(1) = (Y(1) - Y(1 - 1))/X(1)	SPISET	12
IF(N_EG.2) GU TO 5	SPISET	13
DC 2 11=3,N	SPISET	14
I = N+ 3 I I	SPISET	15
D(I-1)=2 + (Y(I)-Y(I-1))/(X(I)+X(I-1))	SPISET	16
Ytl)=1.5+D(1-1)	SPISET	17
$2 \times (1) = 0.5 \pm \times (1-1) / (\times (1) \pm \times (1-1))$	SPISET	18
DC 3 J=1,JMAX	SPISET	19
DC 3 I=3.N	SPISET	20
$3 \cdot (1-1) = M \neq (Y(1)-X(1) \neq 0 (1-2) = (0.5-X(1)) \neq 0 (1) = (M-1.0) \neq 0 (1-1)$	SPISET	21
DC 4 I=J 9N	SPISET	22
X(1)=X(1-1)+(L.5/X(1)-1.)	SPISET	23
$4 Y(1)=0.3333333333334Y(1) \neq (X(1)+X(1-1))+Y(1-1)$	SPISET	24
5 \$AVL=Y(2]-x6*X(2)*(2.*0(1)+D(2)}	SPISET	25
90 5 I=2.9N	SPISET	26
C=R++×(1)	SPISET	27
\$1=Y(1)-C+(2.+C(1-1)+D(1))	SPISET	28
S2=Y(I)+C*(0(I-1)+2.*0(I))	SPIS <u>e</u> t	29
£(1-1)=G.5*(SAVE+S1)	SPISET	30
o SAVE=52	SPISET	31
3(N)=SAVE	SPISET	32
IF (IFR #5. NE. 1) 50 TO 3	SPISET	3.3
F#5=0.	SPISET	34
1F(N-EU-2) 62 TO 6	SPISET	35
00 7 I=3,N	SPISET	36
C=2.*C(1-1)	SPISET	37
$\frac{7 \text{ kMS} = \frac{1}{1} + $	SPISET	38
RHS=2.+SGRT(RHS/AN)	SPISET	39
8 DO 9 i=2.N	SPISET	40
Y(1)=Y(1)=X(1)+Y(1-1)	SPISET	41
$9 \times (1) = \times (1) + \times (1 - 1)$	SPISET	42
RETURN	SPISET	43
	SPISET	44

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	SUDKUUTINE SHEETH (N.X.Y.T.NSHOS)	SNOOTH	2
Ċ	THE Y ARRAY IS SMOOTHED BY A LOCAL FIVE POINT LEAST SQARES.	2H001H	- 3
C	CUBIC HEIGHTEL EY H	SNOOTH	
	DIMENSION X(1),Y(1), T(1)	SMOOTH	5
	IF(N.LT.5) RETURN -	SHOOTH	· 6-
	00 10 NS=1, NSHUS	SHOOTH	-7
	T(1)=NS	SHOOTH	8
		SHOOTH	
	S=(T(1)+(X(N)-X(1))/AN)++2	SHOOTH	10
	DO 4 L=1,N	SHOOTH	- <u>-</u> 11
	K = MINU(N-4, HAXG(1, L-2))	SHOOTH .	12
	K4=X+4	SHOOTH	13
	DO 1 I=1,20	SKOOTH	14
	1 T(I)=0.	SNOOTH	15
	DC 3 h=K,K4	SMOOTH	16
	W=1-7TS+(X(L)-XTH))++2)	SHOOTH	17
	R=1.J	SHOOTH	18
	DO 3 I=1,4	SHOOTH	19
	14=1-4	SHOOTH	Z0
	KK=1.0	240014	21
	ve 2 J=194	SNOOTH	22
	J4= 4 = J +] 4	SHOOTH	23
	Ţ{J+}=Ţ{J4}+K*K¢₩	SHOOTH	24
	2 RR=KR + x (h)	SHOOTH	
	$T(I+16) = T(I+16) + R \neq Y(R) \neq H$	SHOOTH	26
-	3 R=R#X(H)	SHOOTH	27
	CALL CHLSKY(T,4,T(17),1,4)	SHOOTH	28
	H=L-((L-1)/5)*5	SHOOTH	29
	IF(L.5T.5) YIL-5)=T(H+20)	SHOOTH	30
	T(#+20)=0.	SHOOTH	3T
	R=1.0	SHOOTH	32
• •		SHOOTH	
	T(M+20)=T(M+20)+R+T(J+16)	SHOOTH	34
	4 R=+ + X([)	SHOOTH	`35
	14=n-5	SHOOTH	36
	δC 5 C=1,->		-37
	rl=#+L-((r+L-1)/o)+5	SHOOTH	38
	J4=I4+L	5H00TH	39
	$5 Y(J_{4}) = T(nL + 20)$	SHOOTH	40
	10 CONTINUE	SHOUTH	-41
	KE TUK N	SHOOTH	42
		SNOOTH	43

SUBROUTINE CHLSKY (49N+89H+NA)	CHESKY	2
DINEHSION A(NX,1), L(NX,1)	CHLSKY	3.
<u>CHGLESKY CECOPPOSITION IS USED TO SOLVE THE MATRIX EQUATION AX=8</u>	CHLSKY	4
S WHERE THE CCEFFICIENT MATKING AN IS SYMMETRIC. ON OUTPUT X IS	CHESKY	5
STORED IN B	CHLSKY	6
1F(H-EG.1) 60 TO 0	CHLSKY	7
$DO \overline{z} I = 2 N$	CHLSKY	8
<u> </u>	CHLSKY	9
$DC 2 J = I_{0}N$	CHL SK Y	10
	CHESKY	11
2 ▲{I→J}=A(I→J)+A(L→I)+A(L→J)/A(L→L)	CHLSKY	12
00 5 K=1,m	CHLSKY	13
$DO \leq 1 = \zeta_{N}$	ĆHĻSKY	14
	CHLSKÝ	15
<u>00_3 t=1,11</u>	CHLSKY	16
3 B(I,K)=8(I,K)-A(L,I)+3(L,K)/A(L,L)	CHLSKY	17
CG 4 I=2+N	CHLSKY	18
$1 \hat{1} = 1 - 1$	CHLSKY	19
00 4 L=1,11	CHLSKY	20
NI#N-II	CHESKY	21
NL=N+1-L	CHESKY	22
4 B(NI+K)=E(NI+)-L(+I+1++()+-()++)/L(+L+NL)	CHLSKY	23
_QC > 4=1,N	CHLSKY	24
5 B(1.+K)=U(1.+K)/A(1.+1)	CHLSKY	25
RETURN	CHLSKY	26
6 A(1,1)=1./A(1,1)	CHLSKY	27
Dū 7 1=1.H	CHESKY	2.8
7 0(1)[]=(1)]*(1)()	CHLSKY	29
KETUKN	CHESKY	30
ÉNU CONTRACTOR CO	CHESKY	31

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موجود کی مراجع میں ایک در میں میں کی در میں میں در میں میں در میں میں میں در میں میں در میں در میں در میں در می	»	
SUBROUTINE SUBFACHION, TO ABT ABY ABIA INT THE	S12.F1 -	
C FIT DATA IN POINTSI ARGUENT THROUGH ASA AST AT		_7 #
C T TERPURARY ARRAT FOR SPLITTE-SURFACE FASTING		
C A FRUTERIT ANKAEL TON INFUL THIRD TO DEFINET		
L ADALLS - INDERLANDER VIELADER		
A ANTIFI - ANECCONTRACTOR		
C HUTTLE CULLS AN AUTOMATING OF SALES A	SARAL	4
DIMENSION TIME 1) ARY (1) ART(1) ABHS3	SURFL	
IW-6	SALE	. 1
c	SURFL	- 22
NP1=N +1	SURFE	<u>. 13</u>
NP2=NP1+1	SURFI	34
NP3=NP2+1	SURF1-	
NP4=NP3+1	SURF1:	<u> </u>
IF(N.EQ.0) GO TO 13	SURF1	-17
D0 2 I=1,N	SURFT.	
T(1,+NP23-ABX(:1)	SORFI	19.
(1, Mr 3)=887113	SURF1	
2 \198771 ⁻ 80811/ DA 1-1-N	SUBEL	22
111913-00 T (1, NP))=1.0	SHRE1	24
T(NP1+1)+1-6	SURFI	25
T(NP2,1)=T(1,HP2)	SURF1	26
4 T(NP3,I)=T(I, PP3)	SURFI	27
NH1=N-1	, SURF1	28
	SURFI	53
IP1=I+1	SURF1	30
	SURFI	31
XX=T(I,NP2)-T(J;NP2)	SURFI	32
	20KFI	55
$H=XX\neq XX+YY=YY$	20KET	55 75
$1(1, j) = H^* A \in Lo (H)$	SURFI	35
	. CUDET	- 30
	SURE1	38
	SURFI	
JPN≈J+N	SURF1	40
8 T(IPN, JPN)=C.	SURF1	41
K=HSINER(Nh+NP3+1+T(1+1+T(1+NP4))	SURF1	42
IF(K.EG.1) GUTO 9	SURF1	43
HRITE(IH+22C)	SURF1	44
STOP	SURF1	45
9 CONTINUE	SURF1	+6
L SIURF (N+3J-ULEFFIGIENT IN AFRAY ABH	SUKF L	1 1
	50661	
12 ADD113-14190738 13 15/11116 (H.19.14	SURFI	
	SURF 1	51
xFITE(1d,12C) (Abm(1),I=(P1,NP3)	SURFI	52
IF(N.EC.0) Gu Tu 15	SURF 1	53
DC to $I=1,N$	SURFI	54
16 WRITE(1W,11C) I,ABH(1),ACX(1),ABY(1)	SURF 1	55
18 CONTINUE	SURF1	56
RETURN	SURF1	57
110 FCRMAT(10X,15,1P3=14.7)	SURF-1	58
120 FURHAT(62X,1P3E14.7)	SURF1	59
200 FORMAT(1H0,20X,37HWHERE R(1)*+2=(X-X(1))++2+(Y-Y(1))++2/	SURF1	60
11H0,10%,54H(IN DIMENSIONLESS COORDINATES - DISTANCE/CHORD LENC	THI SURFI	61
Z1H0,13x,1n1,3x,4nn(1),10x,4nx(1),10x,4HY(1),	SURF1	·62
315X,2HA0,12X,2HA1,12X,2HA2/)	SURF1	63
Z20 FGRMAT(3X,26HC1D NUT CONVERGE IN SURF1//)	SURF1	64
END	SURHI	65

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SUBROUTINE SURFZEZI,ZZ,JI,JZ,HXT,VALU,VLUX,VLUY,XI,YI,HI,M,K)	SURF2	
COMPUTE VALUE OF SPLINE-SURFACE FITTED DATA AT A POINT TX-YI	SURFZ	
Z1,Z2- COORDINATES OF THE POINT WHERE THE FITTED VALUE IS SOUGHT	SURF2	4
VALU - FITTED VALUE SOUGHT	SURF 2	- 1
VLUX - GRADIENT OF FITTED VALUE IN X	SURF2	
VEUY - GRADIENT OF FITTED VALUE IN Y	SURF2	· 7
XI, YI, HI - ARRAYS FOR KNOWN PROPERTIES IN SPLINE-SURFACE FORM	SURF2	8
N NUMBER OF POINTS IN XI, YI ARRAYS	SURF2	Ş
MXY=J X=21(J), Y=22(J) WHERE J=J1,J2	SURF2	10
MXY=1 X=Z1(1), Y=ZZ(J) ĤĤĒRĒ J=J1,J2	SÜRF2	11
MXY=2 Y=21(1), X=22(J) WHERE J=J1,J2	SURF2	12
DIMENSION $XI(\overline{1})_{\gamma}YI(1)_{\gamma}H\overline{I}(\overline{1})$	ŠŪRE2	13
DIMENSION 21(1)+22(1)+VALU(1)+VLUX(1)+VLUY(1)	SURF2	14
NPI=N +1	SURF2	
NPZ=NP1+1	SURFZ	16
NP3=NP2+1	SURF 2	17
IF(SURF2	18
IF(MXY - EQ - 2) Y = 21(1)	SURF2	14
DC 40 J=J1,J2	SURFZ	20
IF(HXY.[0.1) Y=22(J)	SURFZ	~ ~z
[+{MxY.=0.2} }=22{J}	SURF2	2
IF (MXY.NE.0) GC TO 10	SURF2	Z
X=21(J)	SURE2	24
Y=72(j)	SURE2	7
10 CUNTINUE	SURE2	26
GP To (13,12,111,5	SUREZ -	-77
11 VLUY(J)=HI(NP3)	SURE2	28
12 VLUX(J]=HI(NP2)	SURE2	20
13 VALU(J)=HI(NP1)+HI(NP2)*X+HI(NP3)*Y	SURE2	30
	SHIPE 2	31
16 30 1 = 1 + N	50002	33
TY=X-XTTTT	<u></u>	
$\mathbf{T} = \mathbf{Y} - \mathbf{Y} + \mathbf{I} + \mathbf{I} + \mathbf{I}$	SHĎED	33
H = 15 + 12 + 12 + 12	SHOED	27
$H \Delta = 0$	SUBCO	34
IE(H. GT. O.) HATAT NG IH)	5110E2	20
$h_{R=2}$, h_{1} , h_{R} h_{2} , h_{1} h_{1} h_{1} h_{2} h_{1} h_{2} h_{1} h_{2} h_{2} h_{1} h_{2}	SUDED	20
66 To (23-22-21) K		
	SUDED	39
	50862	-10
	20852	1. fr T 2.
	SURFE	72
	SURES	73
	JURFZ	49
	SUNCO	77
	SUKFZ	96

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			_
	FUNCTION LIN(X1-S)	CIN	Z
С,	SINE AND COSINE INTEGRAL SUBROUTINE	CIN	3
<u> </u>		CIN	4
C 1	IF CALLED BY THE STATEMENT C=CIN(X+S)	CIN	- 5
<u> </u>	<u>C AND S ARE THE INTEGRALS OVER</u> T FROM 1 TO INFINITY OF	CIN	6
E C	COSIXTIVI AND SINIXTIVI	CIN	7
_ C _		CIN	8
	SG=1.0	CIN	9
ĺ	x=x1	CIN	10
[IF (X) 1,2,2	CIN	11
I	1 SG=-SG	CIN	12
]	X=-X	CIN	13
	2 X2=X+X	CIN	14
<u> </u>	IF (X-1.0) 3,3,4	CIN	15
C		CIN	16
C	FOR ABSENT LESS THAN I A SERIES EXPANSION IS USED	CIN	17
C		CIN	18
1	3 V=(((X2/98.G-C.6)+.05+X2+1.0)+X2/18.0-1.0)+X+1.57079633	CIN	19
	U=((X2/45.0+1.C)+X2/24.0+1.0)+X2/4.0577215665-ALOG(X)	CIN	20
	GO TO 5	CIN	21
С		CIN	22
C	FOR ABS(X) GREATER THAN I APPROXIMATIONS OF HASTINGS ARE USED	CÍN	23
С		CIN	24
	4 P=(((x2+19-394119)+x2+47-411538)+x2+8-493336)/((((x2+21-361055))	CIN	25
	1	CIN	26
	Q=(((x2+21.333724)+x2+44.719775)+x2+5.089504)/(((x2+27.177958)	CIN	27
	1	CIN	28
	C0=C0S (Å)	CIN	29
	SI=SIN (x)	CIN	30
	U=G+CC−P+3I	CIN	31
	V=P+CC+C+SI	CIN	32
	<u>5 S=V≑SC</u>	CIN .	33
	CIN=U	CIN	34
	RETURN	CIN	35
	END -	CIN	'36
	· · · ·		

v

	FUNCTION HSINERIH, H.L. 4. B)	HSINER	Z
	DIMENSION A(H,1),B(H,1)	HSINER	3
	D0 30 I = 1,N	MSINER	4
	<u>C = 0.0</u>	MSINER	3
	$DO \ 10 \ J = 1, N$	MSINER	
10	$C = AMAX1 (C_ABS(A(1,JJ)))$	RSINER	17
	IF(C.EQ.0.0) 60 TO 1000	TOTAER	
	$08 \ 20 \ 3 \ = \ 1 \ N$	NSINCK MSINCD	10
20	A11sJJ = A(1sJ)/L	HETHER	
20	$\frac{1}{2} \frac{1}{2} \frac{1}$	MSTNER	12
		MSTNER	· 11
		NSINER	14
		MSINER	15
		MSINER	16
	K = 0	MSIMER	-17
	$00 40 I = J_{1}N$	HSINER	14.
	$\mathbf{D} = \mathbf{ABS}(\mathbf{A}(\mathbf{I},\mathbf{J}))$	MSINER	19
	IF (C.GE.D) GD TO 40	HSINER	20
	<u>K * 1</u>	HSIMER	- 21
	C = D	HSINER	22
- 40	CONTINUE	MSINER	23
	IF(K.EQ.0.DR.C.LT.1.E-7) GO TO 1000	HSIHER	24
	IF(K.EQ.J) GB TB 70	NZIMER	25
	00 50 JJ = J,N	NO LINER	
	$\mathbf{U} = \mathbf{A}\{\mathbf{J}_{\mathbf{J}}, \mathbf{J}_{\mathbf{J}}\}$	HSINER HSTHED	21
EA		HCINED "	20
50		NSTHER	30
		HSTHER	1
	B(1,1,1) = B(K,1,1)	HSIMER	32
60		HSINER	- 33
70	C = A{J_J} ·	MSIMER	34
	· jp = · · · · · · · · · · · · · · · · · ·	HSIHER	35
	Ae 4L = EL 08 00	MSIMER	36
80	〕〕〕、(EL+TA ☱ (LL+L)A	HSIHER	37
90	ÚC 106 JJ = 1,⊧L	MSIMER	38
- 100	P(1)(1) = P(1)(1)(C)	HSTHER	39
	DC 200 I = 1, h	HSINER	40
	IF(I.EQ.J) GG TG 200	HSIMER	41
	$\mathbf{C} = \mathbf{A}\{\mathbf{I},\mathbf{J}\}$	HSIMER	- 42
	· Mett - LL OIL OIL	MOINER	4.5
110	$\{LL_{c},L_{c}\} = \{LL_{c},L_{c}\} = \{LL_{c},L_{c}\}\} = \{LL_{c},L_{c}\} = \{LL_{c},L_{c}\}\} = \{LL_{c},L_{c}\} = \{LL_{c},L_{c}\}\} = \{LL_{c},L,L,L,L,L,L,L,$	<u> </u>	44
1.10	55 120 JJ = 196 J/T (1) = 017 1 1 = (*3(1 (1))		47
200	5(1)JJ - CligJJ - C*(J)JJ	HOITER Scied	40
205		MSINER	48
207	16(4)5(0)-17,167-71,03 1, 1900	HSTHER	49
	$b c \ge b c = 1 + L$	HSIMER	50
- 210	$\Psi(\mathbf{V}, \mathbf{J}) = \Xi(\mathbf{V}, \mathbf{J}) \mathbf{Z}^{-1}$	MSIMFR	51
	1+(N.26.1) 60 TO 230	MSINER	52
	60 220 I = 1.00 M	HSIMER	53
	C = A(I,N)	MSIMER	54
	00 X20 JJ = 1+L .	MSIMER	55
223	(Lue+)_+ (Lue+)_+ (Lue+)	MSIMEx	56
230	MSTREK = 1	HSIHER	57
	AE TURN	⊬SIHEĸ	55
1000	mSINER = 2	HSINER	59
	KETJRN	MSIMER	60
	c ND	MSIMER	<u>_ 61</u>
		-	-

FUNCTION	MSIHEC(H,N+L,A,8)	MSINEC	2
DIMENSIO	N A(N,1),B(N,1)	HSTHEC	····
COMPLEX	A9896	HSINEC	4
DO 30 I	= 1,N	MSINEC	5
C = 0 = 0		HSIMEC	6
DO 10 J	= 1,9N	HSINEC	7 _
10 C=AHAXLE	C-ABS(REAL(A(I,J))),ABS(AIMAG(A(I,J)))	NSIMEC	8
IFIC.EQ.	0.0) GG TU 1000	HSINEC	9
DO 20 J	= 1,N	HSIHEC	10
20 A(1,J) =	A(I,J)/C	HSTHEC	ΞĒ
DO 30 J	= l,L	MSIMEC	12
_ 30 R(1*1) =	B(1,J)/C	HSTHEC	° 13
IF(N.EQ.	1) GD TD 205	HSINEC	14
NH = N -	• •	HSINEC	15
DO 200 J	i = 1;hH	HSINEC	16
C = 0.0		HSTHEC	-17
K = 0		HSINĘC	18
00 40 1	# J9N	HSTHEC	····19
D=ABS (RE	AL(A(I,J)))+ABS(AIHAG(A(J,J)))	HSIHĘC	2,0
IFIC.GE.	C) GO TO 40	MSTHEC	ŹI
. K = I		NSINEC	Z2
<u> </u>		HSTHEC	. 23
40 CONTINUE		MSIMEC	24
ĨF(K.EG.	0. JR. C.LT.1.E-7) GO TO 1000.	HSTHEC "	25
1F(K.EQ.	J) GO TO 70	NSIHĘC	26
DO 50 JJ	I = J ₂ K	HSTREC	27
$G = A\{J\}$,JJ) .	MSIH <u></u> ç	28
A(J,JJ)	= A(K,JJ)	NSTHEC	29
50 A(K,JJ)	= G .	MSINEC	30
DC 50 JJ		"HSINEC"	
$G = B\{J\}$	· 11)	HSINEC	32
	= 5(K,JJ)	HSTHEC	33
60 Б(K+JJ)	= 6	HSINEC	34
70 G = 1.0/	A(J,J)	HSINEC	35
JP = J +		HSIHEC	36
DC 80 JJ	I = JP ₉ N	MSINEC	37
80 A(J,JJ)	= A(J,JJ)73	HSINEC	38
90 DU 100 J		HSIHEC	39
100 5(3,33)		HSIMEC	40
00 200 1		NSTHEC	41
IF(1.50.	J) 60 10 200 '	HSINEC	42
$G = A\{i\}$		MSINEC	43
L 110 J	J = JPsN	HSINEC	44
110 A(1,JJ)	$= A(L_0) J J - G A(J_0) J J$	HZINEC	45
DU 120 J		8518EC	46
120 5(1,JJ)	エ ロイナシフラト 一 アナスイフタフラト	H518EC	47
ZUU CUNIINUE		1311EC	54
$207 \text{ G} = \text{ALN}_{1}$	NI SEALECTA - ARCELLENACION (T. 3 E. 73 CO. TO 3000	HEINEC	9.9 5 0
11 (AB)(KEAL(6)) + ABSTATHAG(6)).LI.1.E-71 60 10 1000	HETHER .	<u></u>
210 070 17 -	1 - 19L	421466	51
	1) CO 70 220	- NOINEL	. 72
15(N+24+ 00 330 1		8318EC	23
00 220 1		NOTHER BETHER	74 " <u>č</u> e
ע עצע טע ייי זים מככ	ia = 1.94. Ω4Τ 145 Λ43 ΝΑΣΩ451, (3)	HEIHER	
220 Bilijjj	- DEIGUS - ALIGNITOUNGUJ	MOINEC	
230 U21U50 =	· 1	NSINC(57
REIUKN		n 3 1 HE C	. 28
1000 HSIMEC =	<u>Z</u>	MSINEC	59
RETURN		NSINEC	60
END		HSINEC	61

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16. Abstract							
A computer program has	been developed to	account a	approximately 1	for the effects of			
finite wing thickness	in transonic potent	ial flow	over an oscil	lating wing of finite			
span. The program is b	based on the origi	nal soni	c-box computer	program for planar			
wing, which has previou	sly been extended	to accou	nt for the effe	ect of wing thick-			
ness. The latter work	pass The latter work is further extended herein to improve computational						
officiency and accuracy	afficiency and accuracy and to accurat for such trailing adapt. Accurat for the						
erriciency and accuracy		. swept					
non-unitorm flow caused	by finite thickne	ss is mad	de by applicati	on of the local			
linearization concept w	with appropriate co	ordinate	transformation	n. A brief			
description of each com	nputer routine and	the appl	ications of cu	oic spline and			
spline-surface data fit	ting techniques us	ed in the	e program are g	jiven, and the			
method of input is show	vn in detail. Samp	le calcu	lations as well	as a complete			
listing of the computer	nrogrom listing o	ro proco	nted				
	program riscing a	ie piesei	iteu.				
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