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A USER'S MANUAL FOR

"CAFE-2"

A TWO-LAYER FINITE ELEMENT CIRCULATION MODEL

by

James R. Pagenkopf
George C. Christodoulou
Bryan R. Pearce
Jerome J. Connor

Ralph M. Parsons Laboratory
for
Water Resources and Hydrodynamics
Department of Civil Engineering
Massachusetts Institute of Technology

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ABSTRACT

A detailed user's manual for "CAFE-2", a two dimensional, two-layer finite element circulation model, is presented. A description of all input data requirements is given, as well as an explanation of printed, punched and file written output information. An example problem is given where "CAFE-2" is used to calculate the solution of tide and wind induced flow in a rectangular estuary with a thermocline. A flow chart is presented defining the basic solution procedure of the model, as well as a listing of the program itself. Additionally included are descriptions of three accessory programs which utilize velocity output from "CAFE-2". The first is a two-layer drogue path program, and the second and third plot drogue paths and velocity vectors respectively. This user's manual should be used in conjunction with the references listed in the bibliography on page 81 , which describe important aspects of model application such as parameter estimation, grid set-up and numerical stability.

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This report is a user's guide to an updated version of the previous modeling efforts made by John D. Wang.

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User's Manual for CAFE-2

1.0 Introduction

The following describes the requirements of the two-layer circulation model, CAFE-2. This model predicts current magnitudes and directions, and surface and interfacial tidal rise at the nodal points of a two-dimensional finite element grid representing the solution field given the following information.

i) the geometry of the solution field in the form of a triangular finite element grid, including the mean-low-water depth of each node.

ii) bottom friction, interfacial friction and eddy viscosity coefficients, average latitude, tidal period, water densities and coriolis component.

iii) prescribed tidal amplitudes and phase lag information along the ocean boundary of the grid, as well as prescribed movement of the interface with time.

iv) location and magnitude of prescribed water heights and flows.

v) magnitude and direction of 10-meter wind force over time.

vi) initial water heights and fluxes at each node and initial interfacial depth (initial conditions).

The user is constrained to metric units in this version of CAFE-2. Units of length (meters) and time (seconds) are indicated in the input description.

2.0 Input Data Requirements

The following describes the specific input data requirements.

Dimension Specifications:

The following cards in the main routine of the program must be adapted for sizes of the dimensioned variables used in the program.

```
DIMENSION TITLE(20),TEXT1(3,2),TEXT2(2,2),TEXT3(2,2),
1 ICON(MAXEL,3), A(MAXEL,3), B(MAXEL,3), AREA(MAXEL,3)
2 NEXT(MAXNOD),NINT(MAXNOD),XORD(MAXNOD),YORD(MAXNOD),DEPTH(MAXNOD),NBC(MAXNOD),
3 SYSMH(MAXNOD,MAXBWH),SYSMQ(MAXMQ,MAXBWQ),
4 H1(MAXNOD),H2(MAXNOD),Q1(MAXMQ),Q2(MAXMQ),H1PREV(MAXNOD),H2PREV(MAXNOD),
5 Q1PREV(MAXMQ),Q2PREV(MAXMQ),SYSFH(MAXNOD),SYSFQ(MAXMQ),SYSFHB(MAXNOD),
6 SYSFQB(MAXMQ),SYSBMH(MAXHBM,MAXBWH),SYSBMQ(MAXQBM,MAXBWQ),NHN(MAXHBN),NQN(MAXQBN),
7 NVN(MAXQBN),HB1(MAXHBN),HB2(MAXHBN),ALAG1(MAXHBN),ALAG2(MAXHBN),QB1(MAXQBN),
                                                                   QB2(MAXQBN),
8 QBANG(MAXQBN),SØX(MAXNOD),SØY(MAXNOD),PSPLUS(MAXNOD),CORX(MAXNOD),CORY(MAXNOD),
9 CFØ(MAXEL),CF1(MAXEL),EDXX(MAXEL),EDYY(MAXEL),EDXY(MAXEL)
  DIMENSION U1(MAXNOD), V1(MAXNOD), U2(MAXNOD), V2(MAXNOD), S1X(MAXNOD), S1Y(MAXNOD)
1 NMLBN(MAXSGM),ICONL(MAXSGM,MAXL),NMOBN(MAXOSM),ICONO(MAXOSM,MAXO),CX(MAXNOD),
                                                                   CY(MAXNOD),
2 CXY(MAXNOD),ETA1(MAXNOD),ETA2(MAXNOD),TAU2X(MAXNOD),TAU2Y(MAXNOD)
  DIMENSION NFLUX(1),FLUX(1),XM(MAXPT),YM(MAXPT),DIRW(MAXWI),GAMW(MAXWI),
1 XW(MAXWI),YW(MAXWI),TT(MAXWI)
```

Where the size parameters, MAXEL, MAXNOD, etc., are defined below and must be included in the main routine as indicated in the coding.

MAXEL	number of elements + 1
MAXNOD	number of nodes + 1
MAXBWH	the bandwidth of the grid, NBANDH, which is defined under card group 3.
MAXMQ	2 x MAXNOD
MAXBWQ	2 x MAXBWH
MAXHBN	total number of nodes on all ocean boundaries (MAXHBN $\geq$ 1)
MAXHBM	2 x MAXHBN
MAXQBN	total number of nodes on all land boundaries (MAXQBN $\geq$ 1)
MAXQBM	2 x MAXQBN
MAXSGM	number of land boundaries (MAXSGM $\geq$ 1)
MAXL	number of nodes on the largest land boundary, including first and last (MAXL $\geq$ 1)
MAXOSM	number of ocean boundaries (MAXOSM $\geq$ 1)
MAXO	number of nodes on the largest ocean boundary, including first and last (MAXO $\geq$ 1)
MAXPT	number of locations (other than nodes) for interpolating U1,U2, V1,V2,H1,H2,ETA1 and ETA2.(MAXPT $\geq$ 1)
MAXWI	number of wind data intervals if IWIND = 1, = TRUNCATE((ENDTIM-STRTIM)/WFREQ) + 3, if IWIND ≠ 1, MAXWI = 1.

Generalized Input Data Description:

Card group 1: Parameters and Options. One card (11I5)

IVERSN { =1 Lake problem - no prescribed height boundaries
=2 Coastal problem - prescribed height on ocean boundaries }

NMEL number of elements

NMNP number of nodes

IFRICØ { =1, Variable bottom friction coefficient, values to be read for each element, see card group 4
=2, constant bottom friction coefficient, value of first element used, see card group 4 }

IFRIC1 { =1, variable interfacial friction coefficient, values to be read for each element, see card group 4.
=2, constant interfacial friction coefficient, value of first element used, see card group 4 }

IDEPTH { =1, variable depth, values to be read for each node, see card group 3
=2, constant depth, value of first node used, see card group 3 }

IEDVIS { =1, variable viscosity coefficient
=2, constant viscosity coefficient } value as for IFRICØ

IWIND { =1, variable wind stress in time
=2, constant wind stress in time
=0, wind stress is ignored }

ICNVEC { =1, convective terms ignored
=2, convective terms included }

INPUTH { =1, ETA set to zero
=2, ETA to be read in }

INPUTQ { =1, Q set to zero
=2, Q to be read in }

Card group 2: Title. One Card (20A4)

Card group 3: Nodal Information. NMNP Cards (2I5, 3F10.0, 8F5.0)
I=1, NMNP, 1
NEXT(I) external node number. NEXT(I) should be input so that NBANDH, the band width is minimized.

NBANDH=maximum over all elements (I=1,NMEL) of 1 plus maximum internal node number of element I minus the minimum internal node number of element I, where the internal node number, NINT(I), is determined by the ordering during read in:
NINT(NEXT(I)) = I, I = 1, NMNP.

NBC(I) node code
= 0 internal node
= 1 prescribed normal flow
= 2 prescribed height
= 3 prescribed height and normal flow
= 4 prescribed normal and tangential flow (≡ 0)
= 5 prescribed height and both flows
= 6 source/sink node

XORD(I) x-coordinate in meters
YORD(I) y-coordinate in meters
DEPTH(I) bottom depth in meters referred to datum (usually MLW). Positive if bottom is below datum, negative if above.
DUM1 to DUM8 } dummy variables used to input prescribed values according to NBC as described below:

NBC = 0 not used (internal node)
= 1 DUM1 = QB1, DUM2 = QB2, DUM3 = QBANG
= 2 DUM1 = HB1, DUM2 = ALAG1, DUM3 = HB2, DUM4 = ALAG2
= 3 DUM1 = HB1, DUM2 = ALAG1, DUM3 = HB2, DUM4 = ALAG2
DUM5 = QB1, DUM6 = QB2, DUM7 = QBANG
= 4 DUM1 = QB1, DUM2 = QB2, DUM3 = QBANG
= 5 and 6 Not in Use

where: QB1, QB2 are local x flows in layer 1 and 2 respectively. QBANG is the angle from the x axis to outward normal at node. The direction of the normal (as in the one-layer case) is determined by requiring net flow across adjoining segments to vanish. (See Appendix A). HB1, HB2 are tidal amplitudes in layers 1 and 2 respectively. ALAG1, ALAG2 are time lags in layers 1 and 2.

Card group 4: Element Data. NMEL Cards, (4I10, F10.0, F6.0, 3F8.0)
I = 1, NMEL, 1
N(I) element number
ICON (N,1)
ICON (N,2) } external node numbers e1, e2, e3 in sense from x
ICON (N,3) toward y.
CFØ(I) bottom friction coefficient
CF1(I) interfacial friction coefficient
EDXX(I)
EDYY(I) } eddy viscosities in meters^2/sec
EDXY(I)

Card group 5: System Properties. One Card (F10.0, E10.3, 4F10.0)

- ALATT latitude north (degrees N)
- OMEGA phase velocity of earth's rotation = $.72722 \times 10^{-4}$ (sec^{-1})
- GRAVT gravitational acceleration = 9.81(m/sec^2)
- PERIOD period of tide (seconds)
- DENST1 density of layer 1 (bottom) (kg/m^3)
- DENST2 density of layer 2 (top) (kg/m^3)

Card group 6: Integration Parameters. One Card (3F10.0, I10.0, F10.0, 6I5)

- STRTIM start time of integration (seconds)
- ENDTIM end time of integration (seconds)
- TINC time increment (seconds)
- NØ external node number for which stability is checked (Ø = zero)
- BOUND bound on height variation at node NØ
- IDT parameter to be used for variable time stepping, use 2 since this has not yet been implemented
- NOUT hard copy output for every NOUT time steps
- ITIMC time step at which fluxes and surface elevations are punched out for hot starting purposes. Usually at end of run. If not wanted, use a large number (ITIMC > ENDTIM/TINC)
- IVELW { =1, if writing velocities and depths on direct access file is desired; =0, if writing on file is not desired }
- IVELP { =1, if punching velocities for plotting purposes is desired; =0, if punching velocities is not desired }
- ITERPO { =1, interpolation option in card group 7 is used; =0, interpolation option is ignored }

Card group 7: Interpolation Option

Only if ITERPO = 1:

Card group 7A: Interpolation Data. One Card (3I10)

- NPOINT number of locations for interpolating velocity components, depths and elevation (both layers)
- ITIMT specified timestep for starting interpolation
- ISTP3 interval of timesteps at which interpolation is repeated until the end of exercise

Card group 7B: Coordinates of Interpolation locations. NPOINT Cards (2F10.0)

I = 1, NPOINT

- XM(I) x-coordinate in meters
- YM(I) y-coordinate in meters

Only if IVELP = 1: Punching Option for Plotting Velocities

Card group 8: Punch Data. One Card (2I10)

- ITIMP specified timestep for starting punching
- ISTP1 interval of timesteps at which punching is repeated until the end of exercise

Only if IVELW = 1: Writing on Direct Access File

Card group 9: Data for writing velocities and depths on a direct access file for use with "DISPER-2". One card (3I10)

ITIMW specified timestep for starting the write sequence

ISTP2 interval of timesteps at which file writing is repeated until ITIMWE (effectively this number (ISTP2*TINC) represents the timestep to be used in "DISPER-2" so one must plan accordingly!)

ITIMWE specified timestep at which file writing ends

Important! If IVELW = 1, then the DEFINE FILE statement in MAIN must be properly introduced as follows:

DEFINE FILE A(B,C,U,IPOINT) MAIN0312

where A is normally a two digit integer used for JCL purposes,
B is an integer, and is the total number of storage points created on the file, and is equal to TRUNCATE ((ITIMWE-ITIMW)/ISTP2)*2 +2
and C is an integer, and is equal to 3*NMNP

Card group 10: Land Boundary Information

Card group 10A: Land Boundary Data. One Card (8I10)
NMLB number of land boundaries
(NMLBN(I), I = 1, NMLB) number of nodes on each land boundary, including first and last

Card group 10B: Segment Connectivity. NMLBN(I)/20 Cards per Boundary (20I4)
I = 1, NMLB
(ICONL(I,J), J = 1, NMLBN(I)) external node numbers on boundary in sequential order such that flow domain is to left of direction of advance

Card group 11:

Only if IVERSN = 1: Ocean Boundary Information

Card group 11A: Ocean Boundary Data. One Card (8I10)
NMOSGM number of ocean boundaries
(NMOBN(I), I = 1, NMOSGM) number of height nodes on ocean boundary, including first and last

Card group 11B: Segment Connectivity. NMOBN(I)/20 Cards per Boundary (20I4)
I = 1, NMOSGM
(ICONB(I,J),J = 1, NMOBN(I)) external node numbers on ocean boundary in sequential order such that flow domain is to left of direction of advance

Card group 12: Initial depth of layer 2. One card (F10.0).
HINIT initial depth of top layer, assumed constant spatially (in meters) if INPUTH = 1. If INPUTH = 2, HINIT determines depth of the top layer initially at the ocean boundary only.

Only if INPUTQ = 2 include data for initial values of fluxes for both layers

Card group 13: ((2*NMNP-1)/8+1) cards (8F10.0) for each layer. (HOTSTART)
(Q1(I), I = 1, 2*NMNP) initial flows in pairs of x- and y-components in layer 1. Internal node ordering
(Q2(I), I = 1, 2*NMNP) initial flows in pairs of x- and y-components in layer 2. Internal node ordering.

Only if INPUTH = 2 include data for initial values of depth of both layers.

Card group 14: ((NMNP-1)/8+1) cards (8F10.0) for each layer. (HOTSTART)
(H1(I), I = 1, NMNP) Nodal depths of layer 1 (bottom)
(H2(I), I = 1, NMNP) Nodal depths of layer 2 (top)

Card group 15: Wind data

Only if IWIND = 1: Variable Wind Magnitude and Direction in Time

Card group 15A: Variable Wind Data Parameters. One Card (F10.0, I10, F10.0)
WSTIM equal to STRTIM in seconds.
LW the number of wind data intervals and is equal to TRUNCATE ((ENDTIM-STRTIM)/WFREQ) + 2
WFREQ time interval in seconds between each set of wind data

Card group 15B: Variable Wind Data. LW*2/8 Cards (8F10.2)
I = 1, LW
DIRW(I) direction (degrees from North) from which wind is blowing
GAMW(I) wind speed in knots

Only if IWIND = 2: Constant Wind Stress in Time

Card group 15C: Constant Wind Data Parameters. One Card (3F10.0)
WTIME time in seconds to which the wind field is specified. Must be equal to or larger than ENDTIM
WMAG wind speed in knots
WDIR direction from which wind is blowing, in degrees from North.

Card group 16: Termination card. One card (16I5)
IVERSN = 0
Instead of termination card, which will stop execution, input for a new problem may be inserted
(repeat card groups 1 through 16)

Note: In this version of the program it is assumed that the tides in both layers are simple sinusoidal functions in time. If different inputs are desired, the corresponding subroutines STHB1 and STHB2 should be appropriately modified.

3.0 Output Description

1: Title

2: NMEL number of elements
NMNP number of nodes
IVERSN model version = 1 or 2
whether bottom friction, interfacial friction, mean low water depth and eddy viscosity are spatially constant or varying
whether wind stress is constant or varying in time, or ignored
whether initial fluxes and depths are set to zero or are "hot" started
whether convective accelerations are included or ignored

3: I = 1, NMNP
NEXT(I) external node number
XORD(I) x-coordinate at external node NEXT(I) (meters)
YORD(I) y-coordinate at external node NEXT(I) (meters)
DEPTH(I) initial mean low water depth at external node NEXT(I)
NBC(I) node code

	if NBC(I) = 1	QB1(I),QB2(I),QBANG(I)
	if NBC(I) = 2	HB1(I),ALAG1(I),HB2(I),ALAG2(I)
see card group 3 under Section 2.0	if NBC(I) = 3	HB1(I),ALAG1(I),HB2(I),ALAG2(I),QB1(I) QB2(I),QBANG(I)
	if NBC(I) = 4	QB1(I),QB2(I),QBANG(I)
	if NBC(I) = 5,6 not in use	

4: Prescribed Boundary and Internal Flux Nodes
NMHBN number of nodes with prescribed heights
NMQBN number of nodes with prescribed local x flux
NMVBN number of nodes with prescribed x and y flux
IFLUX number of internal flux nodes

5: Element Data
I = 1,NMEL
I element number
ICON(I,1), ICON(I,2), ICON(I,3) — external node numbers of the element
CFØ(I) bottom friction coefficient of the element
CF1(I) interfacial friction coefficient of the element
EDXX(I), EDYY(I), EDXY(I) — eddy viscosities of the element

6: If the x and y coordinates of one or more nodes are in error, the message NEGATIVE AREA IN ELEMENT: I is printed and the program is stopped.

7: Geometrical Relations
I element number (I = 1, NMEL)
A1(I) = XORD(ICON(I,3)) - XORD(ICON(I,2))
B1(I) = YORD(ICON(I,2)) - YORD(ICON(I,3))
A2(I) = XORD(ICON(I,1)) - XORD(ICON(I,3))
B2(I) = YORD(ICON(I,3)) - YORD(ICON(I,1))
A3(I) = XORD(ICON(I,2)) - XORD(ICON(I,1))
B3(I) = YORD(ICON(I,1)) - YORD(ICON(I,2))

8: NBANDH band width of the grid

9: If NBANDH is greater than MAXBWH the message 'BANDWIDTH IS TOO LARGE, NBANDH = ' is printed and the program is stopped.

10: SYSTEM PROPERTIES

ALATT	average latitude (degrees N)
CORIO	coriolis parameter
GRAVT	gravitational acceleration
OMEGA	angular velocity of earth rotation
PERIOD	period of harmonic tidal excitation
DENST1	density of layer 1 (bottom)
DENST2	density of layer 2 (top)

11: Only if ITERPO = 1
The heading INTERPOLATION OPTION---SELECTED LOCATIONS FOR FIELD DATA COMPARISONS OF CURRENTS AND TIDES is printed.

NPOINT	number of points for interpolation of layer velocities, depths and elevations
ITIMT	timestep at which interpolation starts
ISTP3	interval of timesteps at which interpolations are repeated

The heading INTERPOLATION POINT NO.,X-COORDINATE, Y-COORDINATE is printed.
I = 1, NPOINT

I	interpolation point number
XM(I)	x-coordinate of point I
YM(I)	y-coordinate of point I

12: Only if IVELP = 1

ITIMP	timestep at which punching of nodal velocities for plotting purposes begins
ISTP1	interval of timesteps at which punching is repeated

13: Only if IVELW = 1

ITIMW	timestep at which writing of nodal velocities and depths on direct access file begins
ISTP2	interval of timesteps at which file writing is repeated
ITIMWE	timestep at which file writing ends
IPTS	total number of storage points created on the file
NMNP3	each storage point has one set of nodal velocities and depths which total to NMNP3 values per point

14: INTEGRATION PARAMETERS

STRTIM	start time of integration
ENDTIM	end time of integration
TINC	constant time increment
NØ	external node at which variation is bounded by BOUND
BOUND	crude stability control

whether the time increment is constant or varying

NOUT	interval of timesteps at which output is printed

15: I = 1, NMLB
LAND SEGMENT (I) NODES, NMLBN = (NMLBN(I))
EXTERNAL NODE NUMBERS - NEXT(ICONL(J,I),J = 1, NMLBN(I))
INTERNAL NODE NUMBERS - NINT(ICONL(J,I),J = 1, NMLBN(I))

16: Only if IVERSN = 2
The heading MODEL VERSION 2 CHOSEN. THE ADDITIONAL BOUNDARY SEGMENTS, NMOSGM = , is printed
I = 1, NMOSGM
SEGMENT(I) NUMBER OF NODES, NMOBN = (NMOBN(I))
EXTERNAL NODE NUMBERS - NEXT(ICONB(J,I), J = 1, NMOBN(I))
INTERNAL NODE NUMBERS - NINT(ICONB(J,I), J = 1, NMOBN(I))

17: Only if INPUTH = 1
HINIT initial depth of layer 2 (meters)

18: Only if INPUT Q = 2
Q1(I),I=1,NMNP
Q2(I),I=1,NMNP } initial values of layer fluxes for layers 1 and 2, respectively, internal order (meters^2/sec)

19: Only if INPUT H = 2
H1(I),I=1,NMNP
H2(I),I=1,NMNP } initial values of layer depths for layers 1 and 2, respectively, internal order (meters)

20: <u>Only</u> if IWIND = 2

WTIME	time to which constant wind field is specified (always greater than ENDTIM)
WMAG	constant wind magnitude in knots
WDIR	constant wind direction from true north
TAUX	x-component of constant wind shear stress
TAUY	y-component of constant wind shear stress

21: <u>Only</u> if IWIND = 1 (at intervals of WFREQ seconds)

GAMW	variable wind magnitude in knots at given time
DIRW	variable wind direction from true north at given time
TIME	time at which wind data is updated
TAUX	x-component of wind shear stress
TAUY	y-component of wind shear stress

22:

TIME	time at which output is being printed
TINC	time increment
ITIME	time step at which output is being printed
VOL1	net excess volume for layer 1 (meters)^3
VOL2	net volume above initial MLW (meters)^3
IPOINT	the latest storage location filled on direct access file at the time output is printed. If velocities and depths are not being stored on file, IPOINT = -1.

23: I internal node number (I = 1,NMNP)

NEXT(I)	external node number
H1(I)	depth of layer 1 (meters)
Q1(2*I-1)	x-component of flux in layer 1 (meters^2/sec)
Q1(2*I)	y-component of flux in layer 1 (meters^2/sec)
ETA1(I)	interfacial elevation rise (meters)
U1(I)	x-component of velocity in layer 1 (meters/sec)
V1(I)	y-component of velocity in layer 1 (meters/sec)
H2(I)	depth of layer 2 (meters)
Q2(2*I-1)	x-component of flux in layer 2 (meters^2/sec)
Q2(2*I)	y-component of flux in layer 2 (meters^2/sec)
ETA2(I)	surface elevation rise (meters)
U2(I)	x-component of velocity in layer 2 (meters/sec)
V2(I)	y-component of velocity in layer 2 (meters/sec)

24: If solution becomes numerically unstable, the message STABILITY CHECK: BOUND EXCEEDED AT NODE NØ is printed

H(NØ)	total depth at stability check node NØ
DEPTH(N)	MLW datum depth at stability check node NØ (see card group 6 in section 2.0)
BOUND	specified limit on surface rise at node NØ

25: Only if IVELW = 1:
velocities and depths (U2(I), V2(I), H2(I), U1(I), V1(I), H1(I), I = 1, NMNP) are written on a direct access file in internal order starting at timestep ITIMW and from then on at intervals of ISTP2 timesteps until ITIMWE.

26: Only if IVELP = 1:
velocities (U2(I), V2(I), U1(I), V1(I), I = 1, NMNP)are punched on cards in internal order starting at timestep ITIMP and from then on at intervals of ISTP1 timesteps until the end. Preceding each set of velocities is a card with the timestep at which punching occurred.

27: Only if ITERPO = 1: Interpolation Data

TIME	time at which interpolation is executed
ITIME	timestep at which interpolation is executed
I = 1, NPOINT	
I	interpolation point number
DEPTH-1	depth of layer 1 (meters)
ELEV-1	interfacial elevation rise (meters)
XVEL-1	x-component of velocity in layer 1 (meters/sec)
YVEL-1	y-component of velocity in layer 1 (meters/sec)
DEPTH-2	depth of layer 2 (meters)
ELEV-2	surface elevation rise (meters)
XVEL-2	x-component of velocity in layer 2 (meters/sec)
YVEL-2	y-component of velocity in layer 2 (meters/sec)

28: Only if ITIMC is less than or equal to ENDTIM
Fluxes and elevations (Q1(2*I-1), Q1(2*I), Q2(2*I-1), Q2(2*I), ETA1(I), FTA2(I), I=1,NMNP) are punched on cards in internal order for hot-starting at timestep ITIMC.

Steps 21-28 are repeated as necessary throughout the exercise. In particular steps 22 and 23 are printed every NOUT timesteps.

Example No. 1: Coastal Estuary With Thermocline Conditions

The finite element grid used is shown in Figure 1. There are 80 ements and 63 nodes. The three nodes on the left end of the grid are "ocean" boundary nodes, and the remaining three sides constitute a le no-flux or "land" boundary. The initial depth of each node is ified as a constant 50 meters, with a density interfacial depth of eters from the bottom. A periodic tide is forced at the ocean boundary des 1, 2 and 3 with a surface amplitude of 1 meter and an interfacial plitude of 0.5 meters. There is no phase lag across the boundary and e tidal period is set equal to 45,000 seconds. Since there is an open ean boundary in this example, IVERSN = 2 is chosen as defined in section .0.

Unlike the generalized version of CAFE-1, the present version of AFE-2 does not have the provision for varying (temporally) the tidal plitude and MLW datum at the ocean boundary. If such capabilities are sired, the subroutines STHB1 and STHB2 should be appropriately modified. patially, however, the tidal amplitude and MLW datum may be chosen as ny variation across the ocean boundary.

The computation is run from 0.0 seconds to 20,000 seconds with a time ncrement of 50 seconds. The crude stability control, BOUND, equals meters at node 40. Output is printed every 25 timesteps. Two locations ther than nodes are chosen to interpolate velocity, depth and surface rise information starting at 500 seconds and from then on at intervals of 500 seconds or 10 timesteps. Convective terms are included.

The eddy viscosity coefficients are held spatially constant with $E_{xx} = E_{yy} = E_{xy} = 50$ meters^2/second. The bottom friction and interfacial friction coefficients are held spatially constant with values of 0.01 and 0.001, respectively. Surface rise and flux are initially set to zero, as the problem begins as an approximation of low slack water. Nodal velocities are punched out for plotting purposes starting at 2500 seconds and from then on at intervals of 5000 seconds or 100 timesteps. Punching for hot starting purposes is desired at the last timestep (400). The option for wind force to vary temporally is chosen. The wind data interval is chosen as 5000 seconds which requires 6 sets of wind magnitude and direction data.

A surface amplitude of 1 meter, an interfacial amplitude of 0.5 meters and a tidal

period of 45,000 seconds are prescribed at the ocean boundary formed by nodes 1, 2 and 3.

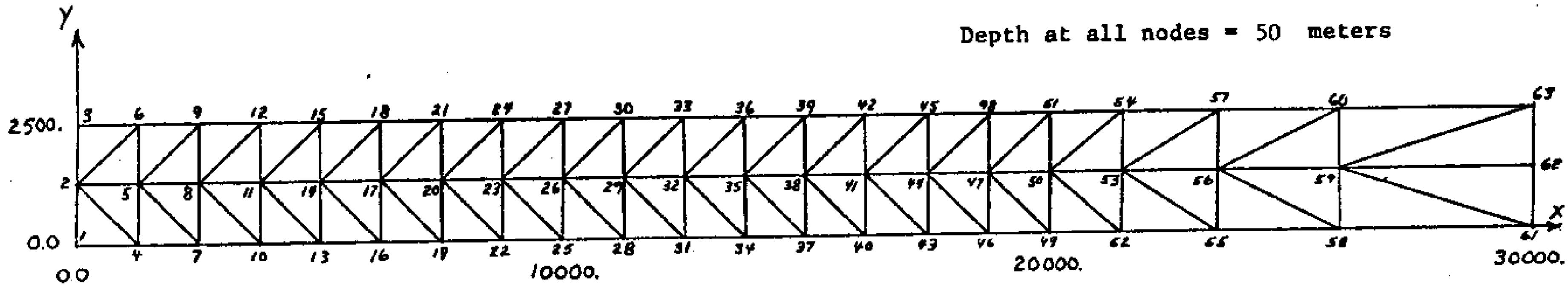

Figure 4-1 Finite element grid for the example No. 1

The input is as follows:

Dimension Specifications in MAIN:

```
   DIMENSION TITLE(20),TEXT1(3,2),TEXT2(2,2),TEXT3(2,2),
1  ICON(81,3),A(81,3),B(81,3),AREA(81,3),
2  NEXT(64),NINT(64),YORD(64),XORD(64),DEPTH(64),NBC(64),
3  SYSMH(64,5),SYSMQ(128,10),
4  H1(64),H2(64),Q1(128),Q2(128),H1PREV(64),H2PREV(64),
5  Q1PREV(128),Q2PREV(128),SYSFH(64),SYSFQ(128),SYSFHB(64),
6  SYSFQB(128),SYSBMH(6,5),SYSBMQ(86,10),NHN(3),NQN(43),
7  NVN(43),HB1(3),HB2(3),ALAG1(3),ALAG2(3),QB1(43),QB2(43),
8  QBANG(43),SØX(64),SØY(64),PSPLUS(64),CORX(64),CORY(64),
9  CFØ(81),CF1(81),EDXX(81),EDYY(81),EDXY(81)
   DIMENSION U1(64),V1(64),U2(64),V2(64),S1X(64),S1Y(64),
1  NMLBN(1),ICONL(1,43),NMOBN(1),ICONO(1,3),CX(64),CY(64),
2  CXY(64),ETA1(64),ETA2(64),TAU2X(64),TAU2Y(64)
   DIMENSION NFLUX(1),FLUX(1),XM(2),YM(2),DIRW(7),GAMW(7),
1  XW(7),YW(7),TT(7)
```

Further Parameter Specification in MAIN:

```
MAXEL = 81 . . . . . . . . . . . . . . . . . . . . . . . MAIN0028
MAXNOD = 64 . . . . . . . . . . . . . . . . . . . . . . .MAIN0029
MAXBWH = 5 . . . . . . . . . . . . . . . . . . . . . . . MAIN0030
MAXMQ = 2*MAXNOD . . . . . . . . . . . . . . . . . . . . MAIN0031
MAXBWQ = 2*MAXBWH . . . . . . . . . . . . . . . . . . . .MAIN0032
MAXHBN = 3 . . . . . . . . . . . . . . . . . . . . . . . MAIN0033
MAXHBM = 2*MAXHBN . . . . . . . . . . . . . . . . . . . .MAIN0034
MAXQBN = 43 . . . . . . . . . . . . . . . . . . . . . .  MAIN0035
MAXQBM = 2*MAXQBN . . . . . . . . . . . . . . . . . . . .MAIN0036
MAXSGM = 1 . . . . . . . . . . . . . . . . . . . . . . . MAIN0037
MAXL = 43 . . . . . . . . . . . . . . . . . . . . . . .  MAIN0038
MAXOSM = 1 . . . . . . . . . . . . . . . . . . . . . . . MAIN0039
MAXO = 3. . . . . . . . . . . . . . . . . . . . . . . . .MAIN0040
MAXPT = 2 . . . . . . . . . . . . . . . . . . . . . . . .MAIN0041
MAXWI = 7 . . . . . . . . . . . . . . . . . . . . . . . .MAIN0042
```

Input Data:

```
Card 1:  IVERSN =  2
         NMEL   = 80
         NMNP   = 63
         IFRICØ =  2
         IFRIC1 =  2
         IDEPTH =  2
         IEDVIS =  2
         IWIND  =  1
         ICNVEC =  2
         INPUTH =  1
         INPUTQ =  1
```

Card 2: EXAMPLE NO. 1: COASTAL ESTUARY WITH THERMOCLINE

Cards 3-65:

NEXT(I)	NBC(I)	XORD(I)	YORD(I)	DEPTH(I)	DUM1	DUM2	DUM3	DUM4	DUM5	DUM6	DUM7
1	3	0.0	0.0	50.0	0.5	0.0	1.0	0.0	0.0	0.0	270.0
2	2	0.0	1250.0	-	0.5	0.0	1.0	0.0	-	-	-
3	3	0.0	2500.0	-	0.5	0.0	1.0	0.0	0.0	0.0	90.0
4	1	1250.0	0.0	-	0.0	0.0	270.0	-	-	-	-
5	0	1250.0	1250.0	-	-	-	-	-	-	-	-
6	1	1250.0	2500.0	-	0.0	0.0	90.0	-	-	-	-
7	1	2500.0	0.0	-	0.0	0.0	270.0	-	-	-	-
8	0	2500.0	1250.0	-	-	-	-	-	-	-	-
9	1	2500.0	2500.0	-	0.0	0.0	90.0	-	-	-	-
10	1	3750.0	0.0	-	0.0	0.0	270.0	-	-	-	-
.	.	.	.	.	.	.	.	.	.	.	.
:	:	:	:	:	:	:	:	:	:	:	:
61	1	30000.0	0.0	-	0.0	0.0	315.0	-	-	-	-
62	1	30000.0	1250.0	-	0.0	0.0	0.0	-	-	-	-
63	1	30000.0	2500.0	-	0.0	0.0	45.0	-	-	-	-

etc.

Cards 66-145:

N(I)	ICON(N(I),1)	ICON(N(I),2)	ICON(N(I),3)	CFØ(I)	CF1(I)	EDXX(I)	EDYY(I)	EDXY(I)
1	3	2	6	0.01	0.001	50.0	50.0	50.0
2	2	1	4	-	-	-	-	-
3	6	2	5	-	-	-	-	-
4	2	4	5	-	-	-	-	-
5	6	5	9	-	-	-	-	-
6	5	4	7	-	-	-	-	-
7	9	5	8	-	-	-	-	-
8	5	7	8	-	-	-	-	-
9	9	8	12	-	-	-	-	-
10	8	7	10	-	-	-	-	-

etc.

Card 146: ALATT = 40.0
OMEGA = 72.722E-06
GRAVT = 9.81
PERIOD = 45000.0
DENST1 = 1015.0
DENST2 = 1000.0

Card 147: STRTIM = 0.0
ENDTIM = 20,000.0
TINC = 50.0
NØ = 40
BOUND = 5.0
IDT = 2
NOUT = 25
ITIMC = 400
IVELW = 0
IVELP = 1
ITERPO = 1

Card 148: NPOINT = 2
ITIMT = 10
ISTP3 = 10

Cards 149,150:

I = 1, NPOINT

XM(I)	YM(I)
4375.0	1250.0
18125.0	1250.0

Card 151: ITIMP = 50
ISTP1 = 100

Card 152: NMLB = 1
NMLBN(1) = 43

Cards 153-155:

ICONL(I,1),I = 1, 43
1,4,7,10,13,16,19,22,25,28,31,34,37,40,43,46,49,52,55,58,
61,62,63,60,57,54,51,48,45,42,39,36,33,30,27,24,21,18,15,12,
9,6,3

Card 156: NMOSGM = 1
NMOBN(1) = 3

Card 157: ICONB(I,1),I = 1,3
3,2,1

Card 158: HINIT = 20.0

Card 159: WSTIM = 0.0
LW = 6
WFREQ = 5000.0

Cards 160-161:

DIRW(I),GAMW(I),I = 1, LW
270.0, 10.0, 270.0, 10.0, 270.0, 10.0, 270.0, 10.0
270.0, 10.0, 270.0, 10.0

Card 162: IVERSN = 0
The output for this example is given on pages 23 to 36.

Printed Output for Example 1.0

EXAMPLE NO. 1: COASTAL ESTUARY WITH THERMOCLINE

* *

THIS PROBLEM HAS THE FOLLOWING CHARACTERISTICS:

NUMBER OF ELEMENTS, NMEL = 40
NUMBER OF NODES, NNOP = 63
THE MODEL APPLIED IS VERSION 2
IT IS ASSUMED THAT SPATIALLY,
BOTTOM SHEAR COEFFICIENT IS CONSTANT
INTERFACE SHEAR COEFFICIENT IS CONSTANT
MEAN LOW WATER DEPTH IS CONSTANT
EDDY VISCOSITY IS CONSTANT
WIND STRESS IS VARYING IN TIME AND IS SPATIALLY CONSTANT
INITIAL VALUES OF H ARE SET TO 0
INITIAL VALUES OF Q ARE SET TO 0
CONVECTIVE ACCELERATIONS ARE INCLUDED

* *

NODE NUMBER	X-COORDINATE (M)	Y-COORDINATE (M)	DEPTH (MLW) (M)	NODE CODE	INTFA. AMPLI. (M)	TIME LAG (SEC)	SURFA. AMPLI. (M)	TIME LAG (SEC)	N-FLUX LAY. 1 (M2/S)	N-FLUX LAY. 2 (M2/S)	FLUX ANGLE (DEG)	Y-FLUX (M2/S)	SOURCE FLUX (M/S)
1	0.0	0.0	50.00	1	0.50	0.	1.00	0.	0.0	0.0	270.		
2	0.0	1250.00	50.00	2	0.50	0.	1.00	0.					
3	0.0	2500.00	50.00	1	0.50	0.	1.00	0.	0.0	0.0	90.		
4	1250.00	0.0	50.00	1					0.0	0.0	270.		
5	1250.00	1250.00	50.00	0									
6	1250.00	2500.00	50.00	1					0.0	0.0	90.		
7	2500.00	0.0	50.00	1					0.0	0.0	270.		
8	2500.00	1250.00	50.00	0									
9	2500.00	2500.00	50.00	1					0.0	0.0	90.		
10	3750.00	0.0	50.00	1					0.0	0.0	270.		
11	3750.00	1250.00	50.00	0									
12	3750.00	2500.00	50.00	1					0.0	0.0	90.		
13	5000.00	0.0	50.00	1					0.0	0.0	270.		
14	5000.00	1250.00	50.00	0									
15	5000.00	2500.00	50.00	1					0.0	0.0	90.		
16	6250.00	0.0	50.00	1					0.0	0.0	270.		
17	6250.00	1250.00	50.00	0									
18	6250.00	2500.00	50.00	1					0.0	0.0	90.		
19	7500.00	0.0	50.00	1					0.0	0.0	270.		
20	7500.00	1250.00	50.00	0									
21	7500.00	2500.00	50.00	1					0.0	0.0	90.		
22	8750.00	0.0	50.00	1					0.0	0.0	270.		
23	8750.00	1250.00	50.00	0									
24	8750.00	2500.00	50.00	1					0.0	0.0	90.		
25	10000.00	0.0	50.00	1					0.0	0.0	270.		
26	10000.00	1250.00	50.00	0									
27	10000.00	2500.00	50.00	1					0.0	0.0	90.		
28	11250.00	0.0	50.00	1					0.0	0.0	270.		
29	11250.00	1250.00	50.00	0									
30	11250.00	2500.00	50.00	1					0.0	0.0	90.		
31	12500.00	0.0	50.00	1					0.0	0.0	270.		
32	12500.00	1250.00	50.00	0									
33	12500.00	2500.00	50.00	1					0.0	0.0	90.		
34	13750.00	0.0	50.00	1					0.0	0.0	270.		
35	13750.00	1250.00	50.00	0									
36	13750.00	2500.00	50.00	1					0.0	0.0	90.		
37	15000.00	0.0	50.00	1					0.0	0.0	270.		
38	15000.00	1250.00	50.00	0									
39	15000.00	2500.00	50.00	1					0.0	0.0	90.		
40	16250.00	0.0	50.00	1					0.0	0.0	270.		
41	16250.00	1250.00	50.00	0									
42	16250.00	2500.00	50.00	1					0.0	0.0	90.		
43	17500.00	0.0	50.00	1					0.0	0.0	270.		
44	17500.00	1250.00	50.00	0									
45	17500.00	2500.00	50.00	1					0.0	0.0	90.		
46	18750.00	0.0	50.00	1					0.0	0.0	270.		
47	18750.00	1250.00	50.00	0									
48	18750.00	2500.00	50.00	1					0.0	0.0	90.		
49	20000.00	0.0	50.00	1					0.0	0.0	270.		
50	20000.00	1250.00	50.00	0									
51	20000.00	2500.00	50.00	1					0.0	0.0	90.		
52	21500.00	0.0	50.00	1					0.0	0.0	270.		
53	21500.00	1250.00	50.00	0									
54	21500.00	2500.00	50.00	1					0.0	0.0	90.		
55	23500.00	0.0	50.00	1					0.0	0.0	270.		
56	23500.00	1250.00	50.00	0									
57	23500.00	2500.00	50.00	1					0.0	0.0	90.		
58	26000.00	0.0	50.00	1					0.0	0.0	270.		
59	26000.00	1250.00	50.00	0									
60	26000.00	2500.00	50.00	1					0.0	0.0	90.		
61	30000.00	0.0	50.00	1					0.0	0.0	315.		
62	30000.00	1250.00	50.00	1					0.0	0.0	0.		
63	30000.00	2500.00	50.00	1					0.0	0.0	45.		

* ** ** ** ** ** ** ** ** ** ** ** ** ** ** *

NUMBER OF PRESCRIBED BOUNDARY AND INTERNAL FLOW NODES

PRESCRIBED HEIGHTS, NHNPP = 3
PRESCRIBED LOCAL Z FLUX, NNORM = 43
PRESCRIBED X AND Y FLUX, NXYPN = 0
INTERNAL FLOW NODES, IFLOW = 0

* *

ELEMENT CONNECTIVITIES.

ELEMENT NUMBER	NODE 1	NODE 2	NODE 3	BOTT. SHEAR COEF.	INTERF. SHEAR COEF.	EDDY XX	EDDY YY	EDDY XY
1	3	2	6	0.010000	0.001000	50.00	50.00	50.00
2	2	1	4	0.010000	0.001000	50.00	50.00	50.00
3	6	2	5	0.010000	0.001000	50.00	50.00	50.00
4	2	4	5	0.010000	0.001000	50.00	50.00	50.00
5	6	5	9	0.010000	0.001000	50.00	50.00	50.00
6	5	4	7	0.010000	0.001000	50.00	50.00	50.00
7	9	5	8	0.010000	0.001000	50.00	50.00	50.00
8	5	7	8	0.010000	0.001000	50.00	50.00	50.00
9	9	8	12	0.010000	0.001000	50.00	50.00	50.00
10	8	7	10	0.010000	0.001000	50.00	50.00	50.00
11	12	8	11	0.010000	0.001000	50.00	50.00	50.00
12	8	10	11	0.010000	0.001000	50.00	50.00	50.00
13	12	11	15	0.010000	0.001000	50.00	50.00	50.00
14	11	10	13	0.010000	0.001000	50.00	50.00	50.00
15	15	11	14	0.010000	0.001000	50.00	50.00	50.00
16	11	13	14	0.010000	0.001000	50.00	50.00	50.00
17	15	14	18	0.010000	0.001000	50.00	50.00	50.00
18	14	13	16	0.010000	0.001000	50.00	50.00	50.00
19	18	14	17	0.010000	0.001000	50.00	50.00	50.00
20	14	16	17	0.010000	0.001000	50.00	50.00	50.00
21	18	17	21	0.010000	0.001000	50.00	50.00	50.00
22	17	16	19	0.010000	0.001000	50.00	50.00	50.00
23	21	17	20	0.010000	0.001000	50.00	50.00	50.00
24	17	19	20	0.010000	0.001000	50.00	50.00	50.00
25	21	20	24	0.010000	0.001000	50.00	50.00	50.00
26	20	19	22	0.010000	0.001000	50.00	50.00	50.00
27	24	20	23	0.010000	0.001000	50.00	50.00	50.00
28	20	22	23	0.010000	0.001000	50.00	50.00	50.00
29	24	23	27	0.010000	0.001000	50.00	50.00	50.00
30	23	22	25	0.010000	0.001000	50.00	50.00	50.00
31	27	23	26	0.010000	0.001000	50.00	50.00	50.00
32	23	25	26	0.010000	0.001000	50.00	50.00	50.00
33	27	26	30	0.010000	0.001000	50.00	50.00	50.00
34	26	25	28	0.010000	0.001000	50.00	50.00	50.00
35	30	26	29	0.010000	0.001000	50.00	50.00	50.00
36	26	28	29	0.010000	0.001000	50.00	50.00	50.00
37	30	29	33	0.010000	0.001000	50.00	50.00	50.00
38	29	28	31	0.010000	0.001000	50.00	50.00	50.00
39	33	29	32	0.010000	0.001000	50.00	50.00	50.00
40	29	31	32	0.010000	0.001000	50.00	50.00	50.00
41	33	32	36	0.010000	0.001000	50.00	50.00	50.00
42	32	31	34	0.010000	0.001000	50.00	50.00	50.00
43	36	32	35	0.010000	0.001000	50.00	50.00	50.00
44	32	34	35	0.010000	0.001000	50.00	50.00	50.00
45	36	35	39	0.010000	0.001000	50.00	50.00	50.00
46	35	34	37	0.010000	0.001000	50.00	50.00	50.00
47	39	35	38	0.010000	0.001000	50.00	50.00	50.00
48	35	37	38	0.010000	0.001000	50.00	50.00	50.00
49	39	38	42	0.010000	0.001000	50.00	50.00	50.00
50	38	37	40	0.010000	0.001000	50.00	50.00	50.00
51	42	38	41	0.010000	0.001000	50.00	50.00	50.00
52	38	40	41	0.010000	0.001000	50.00	50.00	50.00
53	42	41	45	0.010000	0.001000	50.00	50.00	50.00
54	41	40	43	0.010000	0.001000	50.00	50.00	50.00
55	45	41	44	0.010000	0.001000	50.00	50.00	50.00
56	41	43	44	0.010000	0.001000	50.00	50.00	50.00
57	45	44	48	0.010000	0.001000	50.00	50.00	50.00
58	44	43	46	0.010000	0.001000	50.00	50.00	50.00
59	48	44	47	0.010000	0.001000	50.00	50.00	50.00
60	44	46	47	0.010000	0.001000	50.00	50.00	50.00
61	48	47	51	0.010000	0.001000	50.00	50.00	50.00
62	47	46	49	0.010000	0.001000	50.00	50.00	50.00
63	47	50	51	0.010000	0.001000	50.00	50.00	50.00
64	47	49	50	0.010000	0.001000	50.00	50.00	50.00
65	51	50	54	0.010000	0.001000	50.00	50.00	50.00
66	50	49	52	0.010000	0.001000	50.00	50.00	50.00
67	50	53	54	0.010000	0.001000	50.00	50.00	50.00
68	50	52	53	0.010000	0.001000	50.00	50.00	50.00
69	54	53	57	0.010000	0.001000	50.00	50.00	50.00
70	53	52	55	0.010000	0.001000	50.00	50.00	50.00
71	53	56	57	0.010000	0.001000	50.00	50.00	50.00
72	53	55	56	0.010000	0.001000	50.00	50.00	50.00
73	57	56	60	0.010000	0.001000	50.00	50.00	50.00
74	56	55	58	0.010000	0.001000	50.00	50.00	50.00
75	56	59	60	0.010000	0.001000	50.00	50.00	50.00
76	56	58	59	0.010000	0.001000	50.00	50.00	50.00
77	60	59	63	0.010000	0.001000	50.00	50.00	50.00
78	59	58	61	0.010000	0.001000	50.00	50.00	50.00
79	59	62	63	0.010000	0.001000	50.00	50.00	50.00
80	59	61	62	0.010000	0.001000	50.00	50.00	50.00

* *

GEOMETRICAL RELATIONS

ELEMENT NUMBER	A1	B1	A2	B2	A3	B3	AREA
1	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
2	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
3	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
4	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
5	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
6	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
7	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
8	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
9	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
10	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
11	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
12	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
13	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
14	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0

15	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
16	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
17	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
18	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
19	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
20	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
21	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
22	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
23	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
24	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
25	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
26	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
27	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
28	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
29	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
30	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
31	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
32	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
33	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
34	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
35	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
36	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
37	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
38	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
39	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
40	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
41	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
42	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
43	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
44	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
45	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
46	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
47	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
48	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
49	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
50	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
51	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
52	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
53	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
54	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
55	1250.0	0.0	0.0	-1250.0	-1250.0	1250.0	781250.0
56	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
57	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
58	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
59	0.0	-1250.0	-1250.0	1250.0	1250.0	0.0	781250.0
60	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
61	1250.0	-1250.0	-1250.0	0.0	0.0	1250.0	781250.0
62	1250.0	0.0	-1250.0	-1250.0	0.0	1250.0	781250.0
63	0.0	-1250.0	-1250.0	1250.0	1250.0	0.0	781250.0
64	0.0	-1250.0	-1250.0	0.0	1250.0	1250.0	781250.0
65	1500.0	-1250.0	-1500.0	0.0	0.0	1250.0	937500.0
66	1500.0	0.0	-1500.0	-1250.0	0.0	1250.0	937500.0
67	0.0	-1250.0	-1500.0	1250.0	1500.0	0.0	937500.0
68	0.0	-1250.0	-1500.0	0.0	1500.0	1250.0	937500.0
69	2000.0	-1250.0	-2000.0	0.0	0.0	1250.0	1250000.0
70	2000.0	0.0	-2000.0	-1250.0	0.0	1250.0	1250000.0
71	0.0	-1250.0	-2000.0	1250.0	2000.0	0.0	1250000.0
72	0.0	-1250.0	-2000.0	0.0	2000.0	1250.0	1250000.0
73	2500.0	-1250.0	-2500.0	0.0	0.0	1250.0	1562500.0
74	2500.0	0.0	-2500.0	-1250.0	0.0	1250.0	1562500.0
75	0.0	-1250.0	-2500.0	1250.0	2500.0	0.0	1562500.0
76	0.0	-1250.0	-2500.0	0.0	2500.0	1250.0	1562500.0
77	4000.0	-1250.0	-4000.0	0.0	0.0	1250.0	2500000.0
78	4000.0	0.0	-4000.0	-1250.0	0.0	1250.0	2500000.0
79	0.0	-1250.0	-4000.0	1250.0	4000.0	0.0	2500000.0
80	0.0	-1250.0	-4000.0	0.0	4000.0	1250.0	2500000.0

BANDWIDTH OF THIS GRID IS, KBANDE = 5

SYSTEM PROPERTIES.

AVERAGE LATITUDE, ALATT = 40.00 (DEGREES N)
CORIOLIS PARAMETER, CORIO = 2*OMEGA*SIN(ALATT) = 0.935E-04 (SEC-1)
GRAVITATIONAL ACCELERATION, GRAVT = 9.810 (M/SEC2)
ANGULAR VELOCITY OF EARTH ROTATION, OMEGA = 0.727E-04 (SEC-1)
PERIOD OF HARMONIC TIDAL EXCITATION, PERIOD = 45000. (SEC)
DENSITY OF LAYER 1, DENST1 = 1015.00 (KG/M3)
DENSITY OF LAYER 2, DENST2 = 1000.00 (KG/M3)

INTERPOLATION OPTION---SELECTED LOCATIONS FOR FIELD DATA COMPARISONS OF CURRENTS AND TIDES

NUMBER OF POINTS FOR INTERPOLATION OF VELOCITIES AND SURFACE RISE = 2

INTERPOLATION STARTS AT TIMESTEP NO. 10 AND FROM THEN ON AT INTERVALS OF 10 TIMESTEPS

INTERPOLATION POINT NO.	X-COORDINATE (M)	Y-COORDINATE (M)
1	4375.00	1250.00
2	18125.00	1250.00

NODAL VELOCITIES WILL BE PUNCHED FOR PLOTTING PURPOSES STARTING AT TIMESTEP NO. 50
AND FROM THEN ON AT INCREMENTS OF 100 TIMESTEPS

INTEGRATION PARAMETERS,

START TIME OF INTEGRATION, STRTIM = 0.0 SEC
END TIME OF INTEGRATION, ENDTIM = 20000.0 SEC
CONSTANT TIME INCREMENT, TINC = 50.0 SEC
EXTERNAL NODE AT WHICH VARIATION IS RECORDED BY ROUSE, NO = 40
CRUDE STABILITY CONTROL,BOUND = 5.00
THE TIME INCREMENT IS ASSUMED CONSTANT
OUTPUT WILL BE PRINTED FOR EVERY 25 TIMESTEPS

* *

LAND SEGMENT 1 [illegible] NODES, NRLSN = 43
EXTERNAL NODE NUMBERS: 1- 4- 7- 10- 13- 16- 19- 22- 25- 28- 31- 34- 37- 40- 43- 46- 49- 52- 55- 58- 61- 62- 63- 60- 57-
54- 51- 48- 45- 42- 39- 36- 33- 30- 27- 24- 21- 18- 15- 12- 9- 6- 3-
INTERNAL NODE NUMBERS: 1- 4- 7- 10- 13- 16- 19- 22- 25- 28- 31- 34- 37- 40- 43- 46- 49- 52- 55- 58- 61- 62- 63- 60- 57-
54- 51- 48- 45- 42- 39- 36- 33- 30- 27- 24- 21- 18- 15- 12- 9- 6- 3-

* *

MODEL VERSION 2 CHOSEN, THE ADDITIONAL BOUNDARY INFORMATION IS:

NUMBER OF OCEAN SEGMENTS, NSEGO = 1

SEGMENT 1, NUMBER OF NODES, NNCON = 3, EXTERNAL NODE NUMBERS: - 3- 2- 1-
INTERNAL NODE NUMBERS: - 3- 2- 1-

* *

INITIAL DEPTH OF LAYER 2 IS, HINIT = 20.000(M)

* *

* *
WIND MAGNITUDE= 10.00 KNOTS WIND DIRECTION= 270.00 DEGREES TRUE TIME= 50.00 SECONDS
RESULTING STRESSES ARE TAUX= 0.000029 AND TAUY = 0.000000

* *

TIME = 100.00 SEC DELTA T WAS, TINC = 50.00 SEC, TIME STEP, ITIME = 2

NET EXCESS VOLUME FOR LAYER 1, VOL1 = -0.254313E+02
NET VOLUME ABOVE HLM, VOL2 = 0.965990E+02 ISCINT= -1

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NINT	NEXT	DEPTH-1	XFLOW-1	YFLOW-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLOW-2	YFLOW-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.00002	0.00375	-0.00000	0.00002	0.00026	-0.00000	$	20.00001	0.00456	-0.00000	0.00005	0.00023	-0.00000
2	2	30.00002	0.00139	-0.00003	0.00002	0.00005	-0.00000	$	20.00001	0.00418	-0.00004	0.00005	0.00021	-0.00000
3	3	30.00002	0.00375	-0.00000	0.00002	0.00006	-0.00000	$	20.00001	0.00458	-0.00000	0.00005	0.00023	-0.00000
4	4	29.99998	-0.00029	0.00000	-0.00002	-0.00001	0.00000	$	20.00000	0.00201	-0.00000	-0.00002	0.00010	-0.00000
5	5	30.00000	0.00017	0.00014	0.0	0.00001	0.00000	$	20.00000	0.00232	0.00014	0.0	0.00012	0.00001
6	6	29.99998	-0.00028	0.00000	-0.00002	-0.00001	0.00000	$	20.00000	0.00201	-0.00000	-0.00002	0.00010	-0.00000
7	7	30.00000	-0.00011	0.00000	0.0	-0.00000	0.00000	$	19.99998	0.00255	-0.00000	-0.00002	0.00013	-0.00000
8	8	30.00000	-0.00003	-0.00002	0.0	-0.00000	-0.00000	$	20.00000	0.00230	-0.00003	0.0	0.00011	-0.00000
9	9	30.00000	-0.00011	0.00000	0.0	-0.00000	0.00000	$	19.99998	0.00255	-0.00000	-0.00002	0.00013	-0.00000
10	10	30.00000	0.00004	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
11	11	30.00000	0.00023	0.00000	0.0	0.00001	0.00000	$	19.99998	0.00236	0.00000	-0.00002	0.00012	0.00000
12	12	30.00000	0.00004	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
13	13	30.00000	-0.00048	0.00001	0.0	-0.00002	0.00000	$	20.00000	0.00247	-0.00000	0.0	0.00012	-0.00000
14	14	30.00000	-0.00047	-0.00000	0.0	-0.00002	-0.00000	$	20.00000	0.00218	-0.00000	0.0	0.00011	-0.00000
15	15	30.00000	-0.00048	0.00000	0.0	-0.00002	0.00000	$	20.00000	0.00247	-0.00000	0.0	0.00012	-0.00000
16	16	30.00000	0.00024	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00265	-0.00000	0.0	0.00013	-0.00000
17	17	30.00000	0.00001	0.00000	0.0	0.00000	0.00000	$	20.00000	0.00231	-0.00000	0.0	0.00012	-0.00000
18	18	30.00000	0.00024	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00265	-0.00000	0.0	0.00013	-0.00000
19	19	30.00000	-0.00005	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00257	-0.00000	0.0	0.00013	-0.00000
20	20	30.00000	0.00001	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00231	-0.00000	0.0	0.00012	-0.00000
21	21	30.00000	-0.00005	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00257	-0.00000	0.0	0.00013	-0.00000
22	22	30.00000	0.00001	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
23	23	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
24	24	30.00000	0.00001	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
25	25	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
26	26	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
27	27	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
28	28	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
29	29	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
30	30	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
31	31	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
32	32	30.00000	0.00000	0.00000	0.0	0.00000	0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
33	33	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
34	34	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
35	35	30.00000	-0.00000	-0.00000	0.0	-0.00000	-0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
36	36	30.00000	-0.00000	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
37	37	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
38	38	30.00000	-0.00001	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00230	-0.00000	0.0	0.00012	-0.00000
39	39	30.00000	0.00000	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
40	40	30.00000	-0.00001	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00258	-0.00000	0.0	0.00013	-0.00000
41	41	30.00000	0.00005	-0.00000	0.0	0.00000	-0.00000	$	20.00000	0.00231	-0.00000	0.0	0.00012	-0.00000
42	42	30.00000	-0.00001	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00258	-0.00000	0.0	0.00013	-0.00000
43	43	30.00000	-0.00002	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
44	44	30.00000	-0.00021	0.00000	0.0	-0.00001	0.00000	$	20.00000	0.00224	-0.00000	0.0	0.00011	-0.00000
45	45	30.00000	-0.00002	0.00000	0.0	-0.00000	0.00000	$	20.00000	0.00259	-0.00000	0.0	0.00013	-0.00000
46	46	30.00000	0.00048	-0.00000	0.0	0.00002	-0.00000	$	20.00000	0.00265	-0.00000	0.0	0.00013	-0.00000
47	47	30.00000	0.00042	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00252	-0.00000	0.0	0.00013	-0.00000
48	48	30.00000	0.00048	-0.00000	0.0	0.00002	-0.00000	$	20.00000	0.00265	-0.00000	0.0	0.00013	-0.00000
49	49	30.00000	-0.00017	0.00000	0.0	-0.00001	0.00000	$	19.99998	0.00244	-0.00000	-0.00002	0.00013	-0.00000
50	50	30.00000	0.00017	0.00000	0.0	0.00001	0.00000	$	19.99998	0.00237	-0.00000	-0.00002	0.00012	-0.00000
51	51	30.00000	-0.00017	0.00000	0.0	-0.00001	0.00000	$	19.99998	0.00244	-0.00000	-0.00002	0.00013	-0.00000
52	52	30.00000	-0.00048	0.00000	0.0	-0.00002	0.00000	$	20.00000	0.00266	-0.00000	0.0	0.00013	-0.00000
53	53	30.00000	-0.00002	-0.00001	0.0	-0.00000	-0.00000	$	20.00000	0.00244	-0.00000	0.0	0.00012	-0.00000
54	54	30.00000	-0.00049	0.00000	0.0	-0.00002	0.00000	$	20.00000	0.00266	-0.00000	0.0	0.00013	-0.00000
55	55	30.00000	0.00040	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00277	-0.00000	0.0	0.00014	-0.00000
56	56	30.00000	-0.00001	0.00005	0.0	-0.00000	0.00000	$	19.99998	0.00240	-0.00000	-0.00002	0.00012	-0.00000
57	57	30.00000	0.00042	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00277	-0.00000	0.0	0.00014	-0.00000
58	58	30.00000	-0.00009	0.00000	0.0	-0.00000	0.00000	$	19.99999	0.00282	-0.00000	-0.00002	0.00014	-0.00000

59	59	30.00000	-0.00034	-0.00028	0.0	-0.00001	-0.00001	$	20.00002	0.00344	-0.00001	0.00002	0.00017	-0.00000
60	60	30.00000	-0.00073	0.00000	0.0	-0.00001	0.00000	$	19.99998	0.00282	-0.00000	-0.00002	0.00014	-0.00000
61	61	29.99998	-0.00024	-0.00024	-0.00002	-0.00001	-0.00001	$	20.00003	0.00112	0.00112	0.00002	0.00006	0.00006
62	62	30.00000	0.0	0.00179	0.0	0.0	0.00006	$	20.00006	0.0	0.00000	0.00006	0.0	0.00000
63	63	30.00000	0.00036	-0.00036	0.0	0.00001	-0.00001	$	20.00003	0.00112	-0.00112	0.00003	0.00006	-0.00006

TIME = 250.00 SEC DELTA T WAS, TINC = 50.00 SEC. TIME STEP, ITIME = 5

NET EXCESS VOLUME FOR LAYER 1, VOL1 = -0.640032E+03
NET VOLUME ABOVE MLW, VOL2 = 0.661589E+03 IPOINT= -1

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[illegible]	[illegible]	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.00024	0.00829	-0.00000	0.00024	0.00028	-0.00000	$	20.00024	0.01426	-0.00000	0.00049	0.00071	-0.00000
2	2	30.00024	0.00791	-0.00036	0.00024	0.00026	-0.00001	$	20.00024	0.01341	-0.00043	0.00049	0.00067	-0.00002
3	3	30.00024	0.00741	-0.00000	0.00024	0.00025	-0.00000	$	20.00024	0.01303	-0.00000	0.00049	0.00065	-0.00000
4	4	30.00003	0.00547	-0.00000	0.00003	0.00018	-0.00000	$	20.00029	0.00875	-0.00000	0.00032	0.00044	-0.00000
5	5	30.00017	0.00505	0.00002	0.00017	0.00017	0.00000	$	20.00031	0.00913	0.00031	0.00027	0.00046	0.00002
6	6	30.00006	0.00491	-0.00000	0.00006	0.00016	-0.00000	$	20.00020	0.00892	-0.00000	0.00031	0.00045	-0.00000
7	7	30.00012	0.00397	-0.00000	0.00012	0.00010	-0.00000	$	19.99991	0.00843	-0.00000	0.00003	0.00042	-0.00000
8	8	30.00003	0.00190	0.00007	0.00003	0.00006	0.00000	$	20.00008	0.00620	-0.00006	0.00011	0.00031	-0.00000
9	9	30.00011	0.00333	-0.00030	0.00011	0.00011	-0.00000	$	19.99995	0.00866	-0.00000	0.00006	0.00043	-0.00000
10	10	29.99998	0.00044	-0.00000	-0.00002	0.00001	-0.00000	$	20.00000	0.00721	-0.00000	-0.00002	0.00036	-0.00000
11	11	30.00003	0.00141	0.00003	0.00003	0.00005	0.00000	$	19.99995	0.00560	0.00017	-0.00002	0.00028	0.00001
12	12	30.00000	0.00035	-0.00000	0.0	0.00001	-0.00000	$	20.00000	0.00719	-0.00000	0.0	0.00036	-0.00000
13	13	29.99998	-0.00072	0.00000	-0.00002	-0.00002	0.00000	$	19.99997	0.00656	-0.00000	-0.00005	0.00033	-0.00000
14	14	29.99994	-0.00032	-0.00042	-0.00006	-0.00001	-0.00001	$	19.99997	0.00515	-0.00023	-0.00009	0.00026	-0.00001
15	15	30.00000	-0.00127	0.00000	0.0	-0.00004	0.00000	$	19.99998	0.00639	-0.00000	-0.00002	0.00032	-0.00000
16	16	29.99991	-0.00060	0.00000	-0.00009	-0.00002	0.00000	$	19.99997	0.00620	-0.00000	-0.00012	0.00031	-0.00000
17	17	30.00002	-0.00079	-0.00021	0.00002	-0.00003	-0.00001	$	20.00000	0.00455	-0.00010	0.00002	0.00023	-0.00001
18	18	29.99994	-0.00031	0.00000	-0.00006	-0.00001	0.00000	$	20.00000	0.00633	-0.00000	-0.00006	0.00032	-0.00000
19	19	29.99997	-0.00037	0.00000	-0.00003	-0.00001	0.00000	$	20.00000	0.00636	-0.00000	-0.00003	0.00032	-0.00000
20	20	29.99997	-0.00013	0.00000	-0.00003	-0.00000	0.00000	$	19.99997	0.00485	0.00000	-0.00006	0.00024	0.00000
21	21	29.99997	-0.00001	0.00000	-0.00003	-0.00000	0.00000	$	20.00000	0.00649	-0.00000	-0.00003	0.00032	-0.00000
22	22	30.00002	0.00008	-0.00000	0.00002	0.00000	-0.00000	$	19.99995	0.00638	-0.00000	-0.00003	0.00032	-0.00000
23	23	29.99998	-0.00036	-0.00031	-0.00002	-0.00001	-0.00001	$	19.99997	0.00553	0.00001	-0.00005	0.00028	0.00000
24	24	30.00002	-0.00083	0.00000	0.00002	-0.00003	0.00000	$	19.99997	0.00620	-0.00000	-0.00002	0.00031	-0.00000
25	25	29.99994	-0.00142	0.00000	-0.00006	-0.00005	0.00000	$	19.99997	0.00645	-0.00000	-0.00009	0.00032	-0.00000
26	26	30.00000	-0.00029	0.00004	0.0	-0.00001	0.00000	$	20.00000	0.00440	0.00002	0.0	0.00022	0.00000
27	27	29.99997	-0.00021	0.00000	-0.00003	-0.00001	0.00000	$	20.00000	0.00659	-0.00000	-0.00003	0.00033	-0.00000
28	28	30.00000	0.00052	-0.00000	0.0	0.00002	-0.00000	$	19.99998	0.00688	-0.00000	-0.00002	0.00034	-0.00000
29	29	29.99995	-0.00017	0.00005	-0.00005	-0.00001	0.00000	$	19.99995	0.00539	0.00005	-0.00009	0.00027	0.00000
30	30	30.00000	0.00030	-0.00000	0.0	0.00001	-0.00000	$	19.99998	0.00698	-0.00000	-0.00002	0.00035	-0.00000
31	31	29.99995	-0.00078	0.00000	-0.00005	-0.00003	0.00000	$	19.99995	0.00608	-0.00000	-0.00009	0.00030	-0.00000
32	32	30.00002	-0.00073	-0.00009	0.00002	-0.00002	-0.00000	$	20.00000	0.00456	-0.00001	0.00002	0.00023	-0.00000
33	33	29.99997	-0.00071	0.00000	-0.00003	-0.00002	0.00000	$	19.99997	0.00608	-0.00000	-0.00006	0.00030	-0.00000
34	34	29.99997	-0.00020	0.00000	-0.00003	-0.00001	0.00000	$	20.00002	0.00711	-0.00000	-0.00002	0.00036	-0.00000
35	35	29.99997	0.00084	-0.00037	-0.00003	0.00003	-0.00001	$	20.00000	0.00535	-0.00014	-0.00003	0.00027	-0.00001
36	36	30.00002	-0.00040	0.00000	0.00002	-0.00001	0.00000	$	20.00002	0.00700	-0.00000	0.00003	0.00035	-0.00000
37	37	29.99998	0.00089	-0.00000	-0.00002	0.00003	-0.00000	$	19.99995	0.00638	-0.00000	-0.00008	0.00032	-0.00000
38	38	29.99997	-0.00077	-0.00020	-0.00003	-0.00003	-0.00001	$	19.99995	0.00504	0.00030	-0.00008	0.00025	0.00002
39	39	29.99998	0.00049	-0.00000	-0.00002	0.00002	-0.00000	$	19.99997	0.00707	-0.00000	-0.00005	0.00035	-0.00000
40	40	30.00000	-0.00079	0.00000	0.0	-0.00003	0.00000	$	19.99998	0.00642	-0.00000	-0.00002	0.00032	-0.00000
41	41	30.00003	0.00057	0.00024	0.00003	0.00002	0.00001	$	20.00000	0.00521	0.00051	0.00003	0.00026	0.00003
42	42	29.99992	-0.00049	0.00000	-0.00008	-0.00002	0.00000	$	19.99998	0.00626	-0.00000	-0.00009	0.00031	-0.00000
43	43	29.99998	0.00043	-0.00000	-0.00002	0.00001	-0.00000	$	19.99997	0.00719	-0.00000	-0.00005	0.00036	-0.00000
44	44	29.99991	0.00032	-0.00055	-0.00009	0.00001	-0.00002	$	19.99998	0.00558	-0.00014	-0.00011	0.00028	-0.00001
45	45	30.00002	-0.00021	0.00000	0.00002	-0.00001	0.00000	$	19.99998	0.00671	-0.00000	0.0	0.00034	-0.00000
46	46	29.99995	0.00024	-0.00000	-0.00005	0.00001	-0.00000	$	19.99998	0.00604	-0.00000	-0.00006	0.00030	-0.00000
47	47	30.00000	-0.00095	-0.00002	0.0	-0.00003	-0.00000	$	19.99995	0.00450	0.00010	-0.00005	0.00022	0.00000
48	48	29.99995	-0.00005	0.00000	-0.00005	-0.00000	0.00000	$	20.00002	0.00606	-0.00000	-0.00003	0.00030	-0.00000
49	49	30.00006	-0.00062	0.00000	0.00006	-0.00002	0.00000	$	19.99991	0.00667	-0.00000	-0.00003	0.00033	-0.00000
50	50	30.00000	0.00058	-0.00031	0.0	0.00002	-0.00001	$	19.99995	0.00547	0.00026	-0.00005	0.00027	0.00001
51	51	30.00005	0.00024	-0.00000	0.00005	0.00001	-0.00000	$	19.99996	0.00706	-0.00000	-0.00002	0.00035	-0.00000
52	52	29.99994	-0.00022	0.00000	-0.00006	-0.00001	0.00000	$	19.99995	0.00720	-0.00000	-0.00011	0.00036	-0.00000
53	53	29.99995	0.00004	0.00023	-0.00005	0.00000	0.00001	$	20.00000	0.00549	0.00004	-0.00005	0.00027	0.00000
54	54	29.99995	-0.00068	0.00000	-0.00005	-0.00002	0.00000	$	19.99995	0.00712	-0.00000	-0.00009	0.00036	-0.00000
55	55	29.99994	0.00016	-0.00000	-0.00006	0.00001	-0.00000	$	20.00002	0.00696	-0.00000	-0.00005	0.00035	-0.00000
56	56	30.00003	-0.00040	-0.00057	0.00003	-0.00001	-0.00002	$	19.99988	0.00500	-0.00016	-0.00009	0.00025	-0.00001
57	57	29.99995	0.00037	-0.00000	-0.00005	0.00001	-0.00000	$	20.00002	0.00711	-0.00000	-0.00003	0.00036	-0.00000
58	58	30.00008	-0.00118	0.00000	0.00008	-0.00004	0.00000	$	19.99992	0.00670	-0.00000	0.0	0.00033	-0.00000
59	59	29.99994	-0.00276	0.00031	-0.00006	-0.00009	0.00001	$	20.00011	0.00742	0.00001	0.00005	0.00037	0.00000
60	60	30.00005	-0.00148	0.00000	0.00005	-0.00006	0.00000	$	19.99997	0.00640	-0.00000	0.00002	0.00032	-0.00000
61	61	29.99979	-0.00280	-0.00280	-0.00021	-0.00009	-0.00009	$	20.00038	0.00087	0.00087	0.00017	0.00004	0.00004
62	62	29.99974	0.0	0.00159	-0.00026	0.0	0.00005	$	20.00044	0.0	-0.00159	0.00018	0.0	-0.00006
63	63	30.00002	-0.00078	0.00076	0.00002	-0.00003	0.00003	$	20.00017	0.00113	-0.00113	0.00018	0.00006	-0.00006

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TIME= 500.00SEC ITIME= 10

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.00	-0.00	0.00	-0.00	20.00	-0.00	0.00	-0.00
2	30.00	-0.00	-0.00	0.00	20.00	-0.00	0.00	0.00

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TIME= 1000.00SEC ITIME= 20

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.00	-0.00	0.00	0.00	20.00	-0.00	0.00	0.00
2	30.00	-0.00	-0.00	0.00	20.00	-0.00	0.00	0.00

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TIME = 1250.00 SEC DELTA T WAS, TINC = 50.00 SEC. TIME STEP, ITIME = 25

NET EXCESS VOLUME FOR LAYER 1, VOL1 = 0.173331E+06
NET VOLUME ABOVE MLW, VOL2 = 0.357372E+06 IPOINT= -1

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[illegible]	[illegible]	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.00729	0.20387	-0.00000	0.00729	0.00679	-0.00000	$	20.00729	0.17994	-0.00000	0.01459	0.00899	-0.00000
2	2	30.00729	0.18795	-0.00439	0.00729	0.00626	-0.00015	$	20.00729	0.16164	-0.00482	0.01459	0.00808	-0.00024
3	3	30.00729	0.21196	-0.00000	0.00729	0.00706	-0.00000	$	20.00729	0.18189	-0.00000	0.01459	0.00909	-0.00000
4	4	30.00487	0.19613	-0.00000	0.00487	0.00654	-0.00000	$	20.00541	0.16273	-0.00000	0.01328	0.00813	-0.00000
5	5	30.00708	0.17527	0.00041	0.00708	0.00584	0.00001	$	20.00613	0.14461	-0.00006	0.01321	0.00723	-0.00000
6	6	30.00557	0.19376	-0.00000	0.00557	0.00646	-0.00000	$	20.00749	0.16271	-0.00000	0.01346	0.00813	-0.00000
7	7	30.00644	0.17693	-0.00000	0.00644	0.00590	-0.00000	$	20.00169	0.15405	-0.00000	0.01213	0.00770	-0.00000
8	8	30.00604	0.16028	-0.00007	0.00604	0.00534	-0.00000	$	20.00596	0.13042	-0.00044	0.01190	0.00652	-0.00002

9	9	30.00439	0.17687	-0.00000	0.00439	0.00569	-0.00000	$	20.00160	0.15852	-0.00000	0.01199	0.00772	-0.00000
10	10	30.00705	0.15958	-0.00000	0.00705	0.00532	-0.00000	$	20.00195	0.14045	-0.00000	0.01100	0.00702	-0.00000
11	11	30.00690	0.14364	0.00011	0.00690	0.00479	0.00000	$	20.00176	0.11963	0.00027	0.01064	0.00598	0.00001
12	12	30.00673	0.15492	-0.00000	0.00673	0.00523	-0.00000	$	20.00416	0.13990	-0.00000	0.01066	0.00693	-0.00000
13	13	30.00578	0.14179	-0.00000	0.00578	0.00473	-0.00000	$	20.00409	0.13049	-0.00000	0.00987	0.00652	-0.00000
14	14	30.00528	0.12817	-0.00045	0.00528	0.00427	-0.00002	$	20.00418	0.10858	0.00000	0.00946	0.00543	0.00000
15	15	30.00568	0.14325	-0.00000	0.00568	0.00477	-0.00000	$	20.00411	0.13101	-0.00000	0.01001	0.00655	-0.00000
16	16	30.00578	0.12613	-0.00000	0.00578	0.00420	-0.00000	$	20.00311	0.11876	-0.00000	0.00840	0.00594	-0.00000
17	17	30.00549	0.11198	0.00149	0.00549	0.00373	0.00005	$	20.00198	0.09900	0.00087	0.00458	0.00495	0.00004
18	18	30.00499	0.12544	-0.00000	0.00499	0.00419	-0.00000	$	20.00380	0.11849	-0.00000	0.00879	0.00592	-0.00000
19	19	30.00484	0.11233	-0.00000	0.00484	0.00374	-0.00000	$	20.00320	0.11020	-0.00000	0.00804	0.00551	-0.00000
20	20	30.00423	0.10083	-0.00008	0.00423	0.00336	-0.00000	$	20.00311	0.09028	-0.00012	0.00734	0.00451	-0.00001
21	21	30.00467	0.11114	-0.00000	0.00467	0.00370	-0.00000	$	20.00330	0.10900	-0.00000	0.00797	0.00545	-0.00000
22	22	30.00467	0.09519	-0.00000	0.00467	0.00317	-0.00000	$	20.00384	0.09860	-0.00000	0.00711	0.00493	-0.00000
23	23	30.00388	0.08451	0.00040	0.00388	0.00282	0.00001	$	20.00272	0.08021	-0.00010	0.00659	0.00401	-0.00000
24	24	30.00465	0.04536	-0.00000	0.00465	0.00318	-0.00000	$	20.00249	0.09838	-0.00000	0.00714	0.00492	-0.00000
25	25	30.00374	0.08429	-0.00000	0.00374	0.00281	-0.00000	$	20.00256	0.09171	-0.00000	0.00630	0.00458	-0.00000
26	26	30.00354	0.07312	-0.00037	0.00354	0.00244	-0.00001	$	20.00206	0.07168	-0.00035	0.00560	0.00358	-0.00002
27	27	30.00357	0.08384	-0.00000	0.00357	0.00279	-0.00000	$	20.00276	0.09116	-0.00000	0.00633	0.00456	-0.00000
28	28	30.00316	0.06989	-0.00000	0.00316	0.00233	-0.00000	$	20.00221	0.08160	-0.00000	0.00537	0.00409	-0.00000
29	29	30.00290	0.05873	0.00016	0.00290	0.00196	0.00001	$	20.00212	0.06224	-0.00079	0.00502	0.00311	-0.00004
30	30	30.00352	0.06928	-0.00000	0.00352	0.00231	-0.00000	$	20.00191	0.08150	-0.00000	0.00543	0.00407	-0.00000
31	31	30.00302	0.05729	-0.00000	0.00302	0.00191	-0.00000	$	20.00197	0.07358	-0.00000	0.00499	0.00368	-0.00000
32	32	30.00262	0.05293	0.00038	0.00262	0.00176	0.00001	$	20.00159	0.05876	-0.00017	0.00421	0.00294	-0.00001
33	33	30.00271	0.05906	-0.00000	0.00271	0.00197	-0.00000	$	20.00221	0.07520	-0.00000	0.00496	0.00376	-0.00000
34	34	30.00221	0.04816	-0.00000	0.00221	0.00161	-0.00003	$	20.00177	0.06700	-0.00000	0.00398	0.00335	-0.00000
35	35	30.00200	0.03858	0.00091	0.00200	0.00129	0.00003	$	20.00160	0.04850	0.00078	0.00360	0.00242	0.00004
36	36	30.00250	0.04734	-0.00000	0.00250	0.00158	-0.00000	$	20.00130	0.06605	-0.00000	0.00380	0.00330	-0.00000
37	37	30.00278	0.03628	-0.00000	0.00278	0.00121	-0.00000	$	20.00075	0.05963	-0.00000	0.00352	0.00298	-0.00000
38	38	30.00182	0.03241	-0.00309	0.00182	0.00108	-0.00000	$	20.00127	0.04465	-0.00019	0.00308	0.00223	-0.00001
39	39	30.00172	0.03612	-0.00000	0.00172	0.00120	-0.00000	$	20.00189	0.05908	-0.00000	0.00362	0.00295	-0.00000
40	40	30.00200	0.02838	-0.00000	0.00200	0.00095	-0.00000	$	20.00092	0.05309	-0.00000	0.00297	0.00265	-0.00000
41	41	30.00165	0.02315	0.00118	0.00165	0.00077	0.00004	$	20.00078	0.03808	0.00027	0.00243	0.00190	0.00001
42	42	30.00134	0.02859	-0.00000	0.00134	0.00095	-0.00000	$	20.00145	0.05348	-0.00000	0.00279	0.00267	-0.00000
43	43	30.00191	0.01652	-0.00000	0.00191	0.00055	-0.00000	$	20.00353	0.04628	-0.00000	0.00244	0.00231	-0.00000
44	44	30.00110	0.01456	-0.00046	0.00110	0.00050	-0.00002	$	20.00113	0.03166	0.00013	0.00223	0.00158	0.00001
45	45	30.00131	0.01622	-0.00000	0.00131	0.00054	-0.00000	$	20.00111	0.04682	-0.00000	0.00243	0.00234	-0.00000
46	46	30.00162	0.01240	-0.00000	0.00162	0.00041	-0.00000	$	20.00038	0.04446	-0.00000	0.00200	0.00222	-0.00000
47	47	30.00145	0.00734	0.00082	0.00145	0.00024	0.00003	$	20.00017	0.02759	0.00005	0.00162	0.00138	0.00000
48	48	30.00131	0.01210	-0.00000	0.00131	0.00040	-0.00000	$	20.00069	0.04391	-0.00000	0.00200	0.00220	-0.00000
49	49	30.00145	0.00277	-0.00000	0.00145	0.00009	-0.00000	$	20.00020	0.03902	-0.00000	0.00165	0.00195	-0.00000
50	50	30.00107	0.00270	-0.00354	0.00107	0.00009	-0.00002	$	20.00021	0.02531	-0.00003	0.00128	0.00127	-0.00000
51	51	30.00089	0.00344	-0.00000	0.00089	0.00011	-0.00000	$	20.00085	0.04023	-0.00000	0.00174	0.00201	-0.00000
52	52	30.00102	-0.00418	0.00000	0.00102	-0.00014	0.00000	$	20.00020	0.03353	-0.00000	0.00122	0.00168	-0.00000
53	53	30.00056	-0.00537	0.00031	0.00056	-0.00018	0.00001	$	20.00063	0.02221	-0.00165	0.00119	0.00111	-0.00008
54	54	30.00137	-0.00650	0.00000	0.00137	-0.00022	0.00000	$	19.99985	0.03269	-0.00000	0.00122	0.00163	-0.00000
55	55	30.00000	-0.01225	0.00000	0.0	-0.00041	0.00000	$	20.00092	0.02926	-0.00000	0.00092	0.00146	-0.00000
56	56	30.00288	-0.01090	-0.00175	0.00288	-0.00036	-0.00006	$	19.99788	0.01781	-0.00132	0.00076	0.00089	-0.00007
57	57	29.99966	-0.01121	0.00000	-0.00034	-0.00037	0.00000	$	20.00142	0.03020	-0.00000	0.00108	0.00151	-0.00000
58	58	30.00056	-0.01627	0.00000	0.00056	-0.00054	0.00003	$	20.00024	0.02801	-0.00000	0.00081	0.00140	-0.00000
59	59	29.99797	-0.02600	0.00386	-0.00203	-0.00087	0.00013	$	20.00271	0.02165	-0.00221	0.00070	0.00108	-0.00011
60	60	30.00220	-0.02367	0.00000	0.00220	-0.00079	0.00000	$	19.99863	0.02650	-0.00000	0.00082	0.00133	-0.00000
61	61	29.99092	-0.01148	-0.01148	-0.00908	-0.00039	-0.00038	$	20.01006	0.00478	0.00478	0.00098	0.00024	0.00024
62	62	29.99187	0.0	-0.00432	-0.00813	0.0	-0.00014	$	20.00925	0.0	-0.00484	0.00111	0.0	-0.00024
63	63	29.99826	0.00499	-0.00499	-0.00174	0.00017	-0.00017	$	20.00266	0.00557	-0.00557	0.00092	0.00028	-0.00028

* *

TIME= 1500.00SEC ITIME= 30

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.01	0.01	0.01	0.00	20.01	0.01	0.01	0.00
2	30.00	0.00	0.00	0.00	20.00	0.00	0.00	-0.00

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TIME= 2000.00SEC ITIME= 40

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.02	0.01	0.01	0.00	20.01	0.01	0.01	-0.00
2	30.01	0.00	0.00	0.00	20.00	0.00	0.01	-0.00

* *

TIME = 2500.00 SEC DELTA T WAS, TINC = 50.00 SEC. TIME STEP, ITIME = 50

NET EXCESS VOLUME FOR LAYER 1, VOL1 = 0.154662E+07
NET VOLUME ABOVE MLW, VOL2 = 0.283338E+07 IPOINT= 1

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NENT	NEXT	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.02956	0.77677	-0.00000	0.02956	0.02580	-0.00000	$	20.02956	0.60160	-0.00000	0.05911	0.03004	-0.00000
2	2	30.02956	0.70306	-0.03368	0.02956	0.02341	-0.00112	$	20.02956	0.53441	-0.02684	0.05911	0.02668	-0.00134
3	3	30.02956	0.85843	-0.00000	0.02956	0.02859	-0.00000	$	20.02956	0.66725	-0.00000	0.05911	0.03331	-0.00000
4	4	30.02928	0.77409	-0.00000	0.02928	0.02578	-0.00000	$	20.02747	0.60402	-0.00000	0.05675	0.03016	-0.00000
5	5	30.02971	0.67119	-0.00452	0.02971	0.02235	-0.00015	$	20.02643	0.50653	-0.00371	0.05674	0.02529	-0.00019
6	6	30.03146	0.78956	-0.00000	0.03146	0.02629	-0.00000	$	20.02516	0.61327	-0.00000	0.05663	0.03062	-0.00000
7	7	30.03235	0.74773	-0.00000	0.03235	0.02490	-0.00000	$	20.02232	0.58406	-0.00000	0.05467	0.02917	-0.00000
8	8	30.02969	0.64086	-0.00199	0.02969	0.02134	-0.00007	$	20.02483	0.47782	-0.00284	0.05351	0.02386	-0.00014
9	9	30.03316	0.74780	-0.00000	0.03316	0.02490	-0.00000	$	20.02122	0.58432	-0.00000	0.05438	0.02918	-0.00000
10	10	30.03061	0.71843	-0.00000	0.03061	0.02392	-0.00000	$	20.02164	0.56193	-0.00000	0.05225	0.02807	-0.00000
11	11	30.03081	0.60620	0.00047	0.03081	0.02019	0.00002	$	20.02013	0.45577	-0.00118	0.05093	0.02277	-0.00006
12	12	30.03206	0.71496	-0.00000	0.03206	0.02381	-0.00000	$	20.02004	0.55885	-0.00000	0.05214	0.02791	-0.00000
13	13	30.02888	0.68647	-0.00000	0.02888	0.02286	-0.00000	$	20.02136	0.53546	-0.00000	0.05025	0.02674	-0.00000
14	14	30.02895	0.57681	-0.00049	0.02895	0.01921	-0.00002	$	20.01411	0.43321	-0.00191	0.04829	0.02164	-0.00010
15	15	30.03008	0.68276	-0.00000	0.03008	0.02274	-0.00000	$	20.01970	0.53220	-0.00000	0.04985	0.02658	-0.00000
16	16	30.02835	0.64947	-0.00000	0.02835	0.02163	-0.00000	$	20.01362	0.51416	-0.00000	0.04797	0.02568	-0.00000
17	17	30.02669	0.54187	0.00150	0.02669	0.01805	0.00005	$	20.01900	0.40781	-0.00083	0.04568	0.02037	-0.00004
18	18	30.02974	0.64537	-0.00000	0.02974	0.02149	-0.00000	$	20.01416	0.51224	-0.00000	0.04788	0.02559	-0.00000
19	19	30.02734	0.61679	-0.00000	0.02734	0.02054	-0.00000	$	20.01900	0.48950	-0.00000	0.04634	0.02445	-0.00000
20	20	30.02650	0.50788	0.00066	0.02650	0.01691	0.00002	$	20.01711	0.38741	-0.00112	0.04361	0.01935	-0.00006
21	21	30.02737	0.61298	-0.00000	0.02737	0.02087	-0.00000	$	20.01408	0.48762	-0.00000	0.04599	0.02435	-0.00000
22	22	30.02600	0.58328	-0.00000	0.02600	0.01943	-0.00000	$	20.01414	0.46829	-0.00000	0.04418	0.02339	-0.00000
23	23	30.02417	0.47656	0.00152	0.02417	0.01594	0.00035	$	20.01714	0.36445	-0.00006	0.04135	0.01821	-0.00000

24	24	30.02690	0.58115	-0.00000	0.02690	0.01935	-0.00000	$	20.01696	0.46650	-0.00000	0.04184	0.02331	-0.00000
25	25	30.02492	0.54616	-0.00000	0.02492	0.01819	-0.00000	$	20.01775	0.44253	-0.00000	0.04266	0.02213	-0.00000
26	26	30.02193	0.48360	0.00183	0.02193	0.01677	0.00006	$	20.01561	0.34294	0.00024	0.03956	0.01713	0.00001
27	27	30.02632	0.54211	-0.00000	0.02632	0.01835	-0.00000	$	20.01581	0.44100	-0.00000	0.04211	0.02231	-0.00000
28	28	30.02359	0.51550	-0.00000	0.02359	0.01717	-0.00000	$	20.01744	0.42198	-0.00000	0.04103	0.02108	-0.00000
29	29	30.02217	0.41096	-0.00071	0.02217	0.01382	-0.00002	$	20.01529	0.32225	-0.00096	0.03766	0.01610	-0.00005
30	30	30.02496	0.51053	-0.00000	0.02496	0.01700	-0.00000	$	20.01576	0.41887	-0.00000	0.04073	0.02093	-0.00000
31	31	30.02284	0.47794	-0.00000	0.02284	0.01592	-0.00000	$	20.01545	0.39758	-0.00000	0.03870	0.01966	-0.00000
32	32	30.02167	0.37388	0.00101	0.02167	0.01244	0.00001	$	20.01431	0.29467	-0.00005	0.03600	0.01472	-0.00000
33	33	30.02186	0.47736	-0.00000	0.02186	0.01590	-0.00000	$	20.01486	0.39630	-0.00000	0.03873	0.01980	-0.00000
34	34	30.02131	0.44476	-0.00000	0.02131	0.01879	-0.00000	$	20.01627	0.37504	-0.00000	0.03879	0.01874	-0.00000
35	35	30.02025	0.35176	0.00189	0.02025	0.01170	0.00006	$	20.01439	0.27896	-0.00071	0.03433	0.01344	-0.00004
36	36	30.02271	0.44039	-0.00000	0.02271	0.01467	-0.00000	$	20.01489	0.37054	-0.00000	0.03760	0.01851	-0.00000
37	37	30.02162	0.40869	-0.00000	0.02162	0.01361	-0.00000	$	20.01443	0.34908	-0.00000	0.03606	0.01744	-0.00000
38	38	30.01923	0.31280	0.00039	0.01923	0.01039	0.00001	$	20.01160	0.25095	-0.00166	0.03282	0.01254	-0.00008
39	39	30.02257	0.40589	-0.00000	0.02257	0.01352	-0.00000	$	20.01364	0.34821	-0.00000	0.03621	0.01740	-0.00000
40	40	30.01978	0.37294	-0.00000	0.01978	0.01242	-0.00003	$	20.01569	0.32670	-0.00000	0.03526	0.01632	-0.00000
41	41	30.01969	0.28085	0.00044	0.01969	0.00931	0.00001	$	20.01260	0.22949	-0.00076	0.03209	0.01149	-0.00004
42	42	30.02177	0.36671	-0.00000	0.02177	0.01221	-0.00000	$	20.01374	0.32259	-0.00000	0.03496	0.01612	-0.00000
43	43	30.02369	0.33809	-0.00000	0.02369	0.01126	-0.00003	$	20.01277	0.30362	-0.00000	0.03340	0.01517	-0.00000
44	44	30.01959	0.24549	-0.00120	0.01859	0.00814	-0.00027	$	20.01205	0.28847	-0.00270	0.03064	0.01042	-0.00013
45	45	30.02165	0.34073	-0.00000	0.02165	0.01135	-0.00000	$	20.01235	0.30459	-0.00000	0.03180	0.01522	-0.00000
46	46	30.01455	0.25976	-0.00000	0.01455	0.00999	-0.00000	$	20.01346	0.27717	-0.00000	0.03300	0.01385	-0.00000
47	47	30.01333	0.21381	0.00317	0.01333	0.00712	0.00011	$	20.01754	0.18609	0.00127	0.02988	0.00930	0.00006
48	48	30.02110	0.29483	-0.00000	0.02110	0.00982	-0.00000	$	20.01154	0.27549	-0.00000	0.03264	0.01377	-0.00000
49	49	30.01888	0.26577	-0.00000	0.01888	0.00885	-0.00000	$	20.01161	0.25545	-0.00000	0.03189	0.01276	-0.00000
50	50	30.01422	0.17404	-0.00040	0.01422	0.00580	-0.00001	$	20.01112	0.16286	-0.00159	0.02934	0.00814	-0.00008
51	51	30.01923	0.26351	-0.00000	0.01923	0.00878	-0.00000	$	20.01239	0.25534	-0.00000	0.03162	0.01276	-0.00000
52	52	30.01968	0.22711	-0.00000	0.01968	0.00757	-0.00000	$	20.01119	0.22638	-0.00000	0.01082	0.01131	-0.00005
53	53	30.01718	0.13319	0.00158	0.01718	0.00444	0.00005	$	20.01137	0.13744	0.00012	0.02855	0.00687	0.00001
54	54	30.02238	0.22447	-0.00000	0.02238	0.00748	-0.00000	$	20.00485	0.22711	-0.00000	0.03093	0.01135	-0.00000
55	55	30.01485	0.16155	-0.00000	0.01485	0.00538	-0.00000	$	20.01521	0.19381	-0.00000	0.03006	0.00968	-0.00000
56	56	30.02452	0.08178	-0.00092	0.02452	0.00272	-0.00003	$	20.00140	0.09898	-0.00092	0.02792	0.00495	-0.00005
57	57	30.01772	0.16059	-0.00000	0.01772	0.00515	-0.00000	$	20.01212	0.19263	-0.00000	0.02963	0.00963	-0.00000
58	58	30.01419	0.10216	-0.00006	0.01419	0.00341	-0.00000	$	20.01419	0.14125	-0.00000	0.02858	0.00706	-0.00000
59	59	30.00787	0.00037	0.00207	0.00787	0.00301	0.00007	$	20.02332	0.06022	0.00048	0.02820	0.00301	0.00002
60	60	30.01788	0.08071	-0.00000	0.01788	0.00269	-0.00000	$	20.01102	0.14295	-0.00000	0.02890	0.00714	-0.00000
61	61	29.98883	0.00900	0.00900	-0.01157	0.00030	0.00010	$	20.01967	0.01923	0.01923	0.02811	0.00096	0.00096
62	62	29.99480	0.0	-0.00459	-0.00520	0.0	-0.00029	$	20.01191	0.0	0.00494	0.02870	0.0	0.00025
63	63	30.00235	0.04050	-0.04050	0.00215	0.00135	-0.00135	$	20.02597	0.01437	-0.01437	0.02432	0.00072	-0.00072

TIME= 2500.00SEC ITIME= 50

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.03	0.03	0.02	0.00	20.02	0.05	0.02	-0.00
2	30.02	0.02	0.01	0.00	20.01	0.03	0.01	-0.00

TIME= 3000.00SEC ITIME= 60

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.05	0.03	0.03	0.00	20.01	0.05	0.03	-0.00
2	30.04	0.02	0.01	-0.00	20.02	.03	0.01	-0.00

TIME= 3500.00SEC ITIME= 70

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.04	0.03	0.01	0.00	20.04	0.05	0.04	-0.00
2	30.06	0.02	0.01	-0.00	20.04	0.03	0.01	-0.00

TIME = 3750.00 SEC DELTA T WAS, TINC = 50.00 SEC. TIME STEP, ITIME = 75

NET EXCESS VOLUME FOR LAYER 1, VOL1 = 0.509995E+07
NET VOLUME ABOVE ELW, VOL2 = 0.906429E+07 IPOINT= -1

STRT	NEXT	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.06612	1.37768	-0.00001	0.06612	0.04582	-0.00000	$	20.06612	1.06510	-0.00001	0.13223	0.05404	-0.00000
2	2	30.06612	1.18861	-0.09846	0.06612	0.01953	-0.00327	$	20.06612	0.89897	-0.07655	0.13223	0.04480	-0.00382
3	3	30.06612	1.65380	-0.00001	0.06612	0.05501	-0.00000	$	20.06612	1.29765	-0.00000	0.13223	0.06467	-0.00000
4	4	30.07011	1.45196	-0.00001	0.07011	0.04429	-0.00000	$	20.06145	1.12640	-0.00001	0.13156	0.05615	-0.00000
5	5	30.06935	1.16511	-0.01736	0.06935	0.03808	-0.00058	$	20.06100	0.85575	-0.01198	0.13016	0.04266	-0.00070
6	6	30.07240	1.50798	-0.00000	0.07240	0.05014	-0.00000	$	20.05452	1.16598	-0.00000	0.13092	0.05811	-0.00000
7	7	30.07172	1.42711	-0.00001	0.07172	0.04745	-0.00000	$	20.05707	1.10391	-0.00001	0.13078	0.05504	-0.00000
8	8	30.07114	1.09785	-0.00611	0.07114	0.03651	-0.00020	$	20.05721	0.81687	-0.00464	0.12834	0.04043	-0.00023
9	9	30.07678	1.42916	-0.00000	0.07678	0.04752	-0.00000	$	20.05370	1.10728	-0.00000	0.13048	0.05522	-0.00000
10	10	30.07439	1.37854	-0.00001	0.07439	0.04584	-0.00000	$	20.05618	1.06576	-0.00001	0.13052	0.05314	-0.00000
11	11	30.07379	1.04666	-0.00031	0.07379	0.03480	-0.00001	$	20.05261	0.77806	-0.00094	0.12672	0.03880	-0.00005
12	12	30.07759	1.37410	-0.00000	0.07759	0.04569	-0.00000	$	20.05191	1.06212	-0.00000	0.12956	0.05297	-0.00000
13	13	30.07329	1.32845	-0.00001	0.07329	0.04417	-0.00000	$	20.05569	1.02604	-0.00000	0.12898	0.05116	-0.00000
14	14	30.07437	0.99037	0.00052	0.07437	0.03293	0.00002	$	20.05796	0.73665	-0.00056	0.12534	0.03674	-0.00003
15	15	30.07626	1.31910	-0.00000	0.07626	0.04386	-0.00000	$	20.05249	1.01846	-0.00000	0.12875	0.05079	-0.00000
16	16	30.07559	1.27494	-0.00007	0.07559	0.04239	-0.00000	$	20.05127	0.98760	-0.00000	0.12886	0.04925	-0.00000
17	17	30.07251	0.94096	-0.00071	0.07251	0.03129	-0.00002	$	20.05113	0.69843	-0.00097	0.12364	0.03483	-0.00005
18	18	30.07936	1.26177	-0.00000	0.07936	0.04195	-0.00000	$	20.04881	0.97838	-0.00000	0.12817	0.04880	-0.00000
19	19	30.07449	1.21565	-0.00001	0.07449	0.04042	-0.00000	$	20.05173	0.94650	-0.00000	0.12762	0.04720	-0.00000
20	20	30.07315	0.88073	0.00049	0.07315	0.02929	0.00002	$	20.04912	0.65828	-0.00039	0.12247	0.03293	-0.00002
21	21	30.07808	1.20659	-0.00000	0.07808	0.04012	-0.00000	$	20.04982	0.94122	-0.00000	0.12750	0.04696	-0.00000
22	22	30.07199	1.15896	-0.00001	0.07199	0.03854	-0.00000	$	20.05115	0.90657	-0.00000	0.12716	0.04521	-0.00000
23	23	30.07211	0.82518	0.00149	0.07211	0.02745	0.00005	$	20.04991	0.62173	0.00088	0.12125	0.03101	0.00004
24	24	30.07655	1.14821	-0.00000	0.07655	0.03818	-0.00000	$	20.05009	0.89819	-0.00000	0.12665	0.04489	-0.00000
25	25	30.07890	1.10125	-0.00001	0.07890	0.03662	-0.00000	$	20.05148	0.86769	-0.00000	0.12624	0.04327	-0.00000
26	26	30.07092	0.76687	0.00005	0.07092	0.02544	0.00000	$	20.04883	0.57920	-0.00008	0.11975	0.02883	-0.00000
27	27	30.07649	1.09110	-0.00000	0.07649	0.03629	-0.00000	$	20.04895	0.86125	-0.00000	0.12544	0.04296	-0.00000
28	28	30.07346	1.03648	-0.00000	0.07346	0.03446	-0.00000	$	20.05185	0.82302	-0.00000	0.12531	0.04109	-0.00000
29	29	30.07141	0.70597	0.00069	0.07141	0.02349	0.00002	$	20.04756	0.53992	-0.00105	0.11937	0.02693	-0.00005
30	30	30.07617	1.02064	-0.00000	0.07617	0.03413	-0.00000	$	20.04403	0.81486	-0.00000	0.12540	0.04044	-0.00000

31	31	30.07262	0.98347	-0.00000	0.07262	0.03270	-0.00000	$	20.05220	0.70638	-0.00000	0.12482	0.03922	-0.00000
32	32	30.06992	0.84885	-0.00007	0.06992	0.02158	-0.00000	$	20.04784	0.49901	-0.00082	0.11775	0.02409	-0.00004
33	33	30.07530	0.97039	-0.00000	0.07510	0.01227	-0.00000	$	20.04475	0.77895	-0.00000	0.12405	0.03885	-0.00000
34	34	30.07228	0.91126	-0.00000	0.07228	0.03030	-0.00000	$	20.05145	0.73799	-0.00000	0.12373	0.03480	-0.00090
35	35	30.06915	0.58239	-0.00069	0.06915	0.01937	-0.00002	$	20.04797	0.45551	-0.00013	0.11713	0.02272	-0.00003
36	36	30.07576	0.93267	-0.00000	0.07576	0.03001	-0.00000	$	20.04405	0.73093	-0.00000	0.12381	0.03644	-0.00000
37	37	30.07240	0.85246	-0.00000	0.07240	0.02836	-0.00000	$	20.05121	0.69777	-0.00000	0.12361	0.03480	-0.00000
38	38	30.06946	0.52674	0.00096	0.06946	0.01752	0.00003	$	20.04689	0.41528	0.00068	0.11635	0.02072	0.00093
39	39	30.07594	0.84204	-0.00000	0.07504	0.02800	-0.00000	$	20.04782	0.69159	-0.00000	0.12286	0.03450	-0.00000
40	40	30.07231	0.78449	-0.00000	0.07231	0.02609	-0.00000	$	20.04970	0.65456	-0.00000	0.12201	0.03265	-0.00000
41	41	30.06937	0.45647	0.00056	0.06317	0.01518	0.00002	$	20.04623	0.37072	-0.00087	0.11560	0.01869	-0.00004
42	42	30.07483	0.77334	-0.00000	0.07483	0.02571	-0.00000	$	20.04701	0.64507	-0.00000	0.12144	0.03216	-0.00000
43	43	30.07259	0.71610	-0.00000	0.07259	0.02381	-0.00000	$	20.04926	0.60360	-0.00000	0.12184	0.03011	-0.00000
44	44	30.06834	0.39496	-0.00159	0.06834	0.01318	-0.00005	$	20.04680	0.33040	0.00021	0.11514	0.01648	0.00001
45	45	30.07603	0.70678	-0.00000	0.07603	0.02350	-0.00000	$	20.04570	0.59849	-0.00000	0.12173	0.02986	-0.00000
46	46	30.07104	0.65464	-0.00000	0.07104	0.02177	-0.00000	$	20.04984	0.56467	-0.00000	0.12088	0.02816	-0.00000
47	47	30.07249	0.32977	-0.00104	0.07249	0.01097	-0.00003	$	20.04276	0.28043	0.00044	0.11465	0.01399	0.00002
48	48	30.07355	0.63998	-0.00000	0.07355	0.02128	-0.00000	$	20.04677	0.55658	-0.00000	0.12032	0.02776	-0.00000
49	49	30.06953	0.57451	-0.00000	0.06953	0.01911	-0.00000	$	20.05032	0.51488	-0.00000	0.11986	0.02568	-0.00000
50	50	30.06857	0.26064	0.00046	0.06857	0.00867	0.00002	$	20.04587	0.24214	-0.00060	0.11444	0.01208	-0.00003
51	51	30.07411	0.56935	-0.00002	0.07411	0.01893	-0.00000	$	20.04596	0.51184	-0.00000	0.12007	0.02551	-0.00000
52	52	30.07623	0.50405	-0.00000	0.07623	0.01676	-0.00000	$	20.04320	0.45786	-0.00000	0.11943	0.02284	-0.00000
53	53	30.06984	0.17520	-0.00159	0.06984	0.00583	-0.00005	$	20.04828	0.18633	-0.00096	0.11412	0.00930	-0.00005
54	54	30.07751	0.48882	-0.00000	0.07751	0.01624	-0.00000	$	20.04129	0.45278	-0.00000	0.11880	0.02259	-0.00000
55	55	30.06349	0.37469	-0.00000	0.06349	0.01246	-0.00000	$	20.05450	0.39056	-0.00000	0.11800	0.01947	-0.00000
56	56	30.07939	0.07313	-0.00421	0.07939	0.00243	-0.00014	$	20.03491	0.10507	-0.00100	0.11430	0.00524	-0.00005
57	57	30.06961	0.37161	-0.00000	0.06961	0.01236	-0.00000	$	20.04846	0.38567	-0.00000	0.11807	0.01924	-0.00000
58	58	30.05959	0.26382	-0.00030	0.05959	0.00876	-0.00000	$	20.05721	0.27310	-0.00000	0.11679	0.01362	-0.00000
59	59	30.05141	-0.07155	0.00711	0.05141	-0.00238	0.00024	$	20.06172	0.01649	0.00178	0.11513	0.00082	0.00009
60	60	30.05901	0.22965	-0.00000	0.05901	0.00764	-0.00000	$	20.05750	0.27189	-0.00000	0.11650	0.01356	-0.00000
61	61	30.02495	0.06551	0.06551	0.02495	0.00218	0.00219	$	20.09175	0.06107	0.06107	0.11670	0.00304	0.00304
62	62	30.04045	0.0	-0.01181	0.04045	0.0	-0.00039	$	20.07640	0.0	0.00749	0.11685	0.0	0.00037
63	63	30.02998	0.09925	-0.09925	0.02998	0.00331	-0.00331	$	20.08501	0.04868	-0.04868	0.11499	0.00242	-0.00242

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TIME= 4000.00SEC ITIME= 80

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.08	0.07	0.03	-0.00	20.06	0.13	0.04	-0.00
2	30.08	0.07	0.01	-0.00	20.05	0.11	0.02	0.00

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TIME= 4500.00SEC ITIME= 90

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.11	0.07	0.03	-0.00	20.08	0.13	0.04	-0.00
2	30.11	0.07	0.01	0.00	20.07	0.11	0.01	0.00

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WIND MAGNITUDE= 10.00 KNOTS WIND DIRECTION= 270.00 DEGREES TRUE TIME= 5000.00 SECONDS
RESULTING STRESSES ARE TAUX= 0.000029 AND TAUY = 0.000000

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TIME = 5000.00 SEC DELTA T WAS, TIME = 50.00 SEC. TIME STEP, ITIME = 100

NET EXCESS VOLUME FOR LAYER 1, VOL1 = 0.100022E+08
NET VOLUME ABOVE ELW, VOL2 = 0.170220E+08 IPOINT= -1

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NINT	NEXT	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	30.11584	1.49395	-0.00001	0.11584	0.04961	-0.00000	$	20.11586	1.24489	-0.00001	0.23170	0.06189	-0.00000
2	2	30.11584	1.18376	-0.16764	0.11584	0.03931	-0.00557	$	20.11586	0.93455	-0.13285	0.23170	0.04646	-0.00660
3	3	30.11584	1.98463	-0.00001	0.11584	0.06590	-0.00000	$	20.11586	1.61182	-0.00001	0.23170	0.08112	-0.00000
4	4	30.11726	1.63050	-0.00001	0.11726	0.05414	-0.00000	$	20.11543	1.34413	-0.00001	0.23270	0.06682	-0.00000
5	5	30.12253	1.13542	-0.04107	0.12253	0.03769	-0.00136	$	20.10878	0.88082	-0.03092	0.23131	0.04380	-0.00154
6	6	30.12183	1.73817	-0.00001	0.12183	0.05770	-0.00000	$	20.11073	1.42582	-0.00000	0.23256	0.07090	-0.00000
7	7	30.12969	1.62245	-0.00001	0.12969	0.05385	-0.00000	$	20.10526	1.32374	-0.00001	0.23395	0.06584	-0.00000
8	8	30.12747	1.06819	-0.00323	0.12747	0.03545	-0.00011	$	20.10326	0.82335	-0.00490	0.23073	0.04096	-0.00024
9	9	30.13322	1.62661	-0.00001	0.13122	0.05398	-0.00000	$	20.09930	1.32910	-0.00000	0.23253	0.06613	-0.00000
10	10	30.13138	1.56455	-0.00001	0.13138	0.05206	-0.00000	$	20.10303	1.27436	-0.00001	0.23441	0.06339	-0.00000
11	11	30.13417	1.00428	-0.00677	0.13417	0.03333	-0.00022	$	20.09692	0.77511	-0.00407	0.23109	0.03857	-0.00020
12	12	30.13548	1.55812	-0.00000	0.13548	0.05170	-0.00000	$	20.09917	1.26499	-0.00000	0.23465	0.06294	-0.00000
13	13	30.13405	1.50529	-0.00001	0.13405	0.04995	-0.00000	$	20.10168	1.22286	-0.00001	0.23573	0.06083	-0.00000
14	14	30.13419	0.93786	0.00414	0.13419	0.03111	0.00014	$	20.09668	0.72210	0.00356	0.23087	0.03593	0.00018
15	15	30.13640	1.49111	-0.00000	0.13640	0.04948	-0.00000	$	20.09802	1.21315	-0.00000	0.23442	0.06036	-0.00000
16	16	30.13745	1.44057	-0.00001	0.13745	0.04780	-0.00000	$	20.09880	1.17093	-0.00001	0.23625	0.05826	-0.00000
17	17	30.13568	0.86500	-0.00413	0.13569	0.02870	-0.00014	$	20.09543	0.67014	-0.00215	0.23111	0.03335	-0.00011
18	18	30.14067	1.41426	-0.00000	0.14067	0.04692	-0.00000	$	20.09538	1.15500	-0.00000	0.23605	0.05748	-0.00000
19	19	30.13990	1.36654	-0.00001	0.13990	0.04534	-0.00000	$	20.09874	1.11944	-0.00001	0.23764	0.05570	-0.00000
20	20	30.13417	0.79728	0.00463	0.13417	0.02645	0.00015	$	20.09303	0.62220	0.00206	0.23140	0.03097	0.00010
21	21	30.14254	1.35544	-0.00000	0.14254	0.04497	-0.00000	$	20.09427	1.10897	-0.00000	0.23685	0.05519	-0.00000
22	22	30.13826	1.30332	-0.00001	0.13826	0.04324	-0.00000	$	20.09966	1.07089	-0.00001	0.23792	0.05328	-0.00000
23	23	30.11792	0.72007	-0.00041	0.11792	0.02389	-0.00001	$	20.09356	0.56962	-0.00000	0.23190	0.02835	-0.00000
24	24	30.14104	1.27511	-0.00000	0.14104	0.04230	-0.00000	$	20.09625	1.04924	-0.00000	0.23724	0.05221	-0.00000
25	25	30.14341	1.22269	-0.00001	0.14341	0.04057	-0.00000	$	20.09965	1.01043	-0.00000	0.23906	0.05027	-0.00000
26	26	30.13759	0.65202	-0.00095	0.13759	0.02163	-0.00003	$	20.09448	0.52132	-0.00161	0.23207	0.02594	-0.00008
27	27	30.14420	1.20915	-0.00000	0.14420	0.04008	-0.00000	$	20.09521	1.00354	-0.00000	0.23941	0.04994	-0.00000
28	28	30.14119	1.35736	-0.00001	0.14119	0.03940	-0.00000	$	20.09886	0.96627	-0.00000	0.24005	0.04808	-0.00000
29	29	30.13857	0.57317	0.00350	0.13857	0.01902	0.00012	$	20.09418	0.46752	0.00264	0.23274	0.02327	0.00013
30	30	30.14416	1.13608	-0.00000	0.14416	0.03769	-0.00000	$	20.09444	0.95120	-0.00000	0.23860	0.04734	-0.00000
31	31	30.13977	1.08095	-0.00001	0.13977	0.03586	-0.00000	$	20.10034	0.91198	-0.00000	0.24011	0.04537	-0.00000
32	32	30.13969	0.50214	-0.00464	0.13969	0.01666	-0.00015	$	20.09457	0.41888	-0.00248	0.23126	0.02085	-0.00012
33	33	30.14408	1.05558	-0.00000	0.14408	0.03502	-0.00000	$	20.09637	0.99515	-0.00000	0.24042	0.04454	-0.00000

[illegible]	[illegible]	[illegible]	1.00454	-0.00000	0.14355	0.01166	-0.00000	$	20.09791	0.46333	-0.00000	0.24149	0.04296	-0.00020
[illegible]	[illegible]	[illegible]	0.42710	0.00272	0.13757	0.31617	0.00009	$	20.09578	0.36741	0.00151	0.23335	0.01831	0.00098
[illegible]	[illegible]	[illegible]	0.94875	-0.00000	0.14519	0.01296	-0.00000	$	20.09473	0.84431	-0.00000	0.24092	0.04222	-0.00000
[illegible]	[illegible]	[illegible]	0.41365	-0.00000	0.14316	0.03097	-0.00003	$	20.09465	0.80987	-0.00000	0.24159	0.04030	-0.00000
[illegible]	[illegible]	[illegible]	1.35241	-0.00358	0.14172	0.01149	-0.00012	$	20.09293	0.31499	-0.00325	0.23856	0.01568	-0.00016
[illegible]	[illegible]	[illegible]	0.97731	-0.00000	0.14590	0.03311	-0.00000	$	20.09410	0.79565	-0.00000	0.24200	0.03959	-0.00000
[illegible]	[illegible]	[illegible]	0.95710	-0.00000	0.14236	0.02446	-0.00000	$	20.09385	0.76105	-0.00000	0.24190	0.03786	-0.00000
[illegible]	[illegible]	[illegible]	0.27785	0.00115	0.13929	0.00322	0.00011	$	20.09570	0.26803	0.00210	0.23504	0.01334	0.00010
[illegible]	[illegible]	[illegible]	0.44256	-0.00000	0.14525	0.02796	-0.00000	$	20.09660	0.75182	-0.00000	0.24185	0.03741	-0.00000
[illegible]	[illegible]	[illegible]	0.79117	-0.00000	0.14651	0.02425	-0.00000	$	20.10425	0.70934	-0.00003	0.24277	0.03530	-0.00000
[illegible]	[illegible]	[illegible]	0.20176	-0.00007	0.14764	0.02069	-0.00002	$	20.09505	0.21685	0.00052	0.23549	0.01079	0.00033
[illegible]	[illegible]	[illegible]	0.76544	-0.00000	0.14335	0.02533	-0.00000	$	20.09207	0.68778	-0.00000	0.24202	0.03421	-0.00000
[illegible]	[illegible]	[illegible]	0.70948	-0.00000	0.14417	0.02354	-0.00000	$	20.09824	0.66168	-0.00000	0.24220	0.03292	-0.00000
[illegible]	[illegible]	[illegible]	0.31180	-0.00372	0.14719	0.01444	-0.00012	$	20.09926	0.16095	-0.00387	0.23645	0.00801	-0.00019
[illegible]	[illegible]	[illegible]	0.64415	-0.00010	0.14468	0.02270	-0.00000	$	20.09988	0.64998	-0.00000	0.24356	0.03234	-0.00000
[illegible]	[illegible]	[illegible]	0.63380	-0.00000	0.14151	0.02101	-0.00000	$	20.09316	0.61080	-0.00000	0.24295	0.03039	-0.00000
[illegible]	[illegible]	[illegible]	0.35057	0.00142	0.14076	0.03169	0.00005	$	20.09663	0.12069	0.00281	0.23737	0.00601	0.00014
[illegible]	[illegible]	[illegible]	0.61710	-0.00000	0.14412	0.02047	-0.00000	$	20.09396	0.60741	-0.00000	0.24220	0.02991	-0.00000
[illegible]	[illegible]	10.15167	0.55792	-0.00000	0.15167	0.01850	-0.00000	$	20.03076	0.54666	-0.00000	0.24243	0.02721	-0.00000
[illegible]	[illegible]	10.16577	-0.03817	-0.00760	0.16577	-0.00118	-0.00025	$	20.09201	0.05730	-0.00673	0.23779	0.00285	-0.00034
[illegible]	[illegible]	10.15442	0.52889	-0.00000	0.15442	0.01756	-0.00000	$	20.09910	0.53117	-0.00005	0.24352	0.02644	-0.00000
[illegible]	[illegible]	10.13179	0.42477	-0.00000	0.13178	0.01410	-0.00000	$	20.11130	0.46915	-0.00000	0.24304	0.02328	-0.00000
[illegible]	[illegible]	10.15054	-0.14067	-0.00855	0.15054	-0.00467	-0.00028	$	20.09984	-0.03320	-0.00048	0.23938	-0.00165	-0.00002
[illegible]	[illegible]	10.13479	0.43559	-0.00007	0.13478	0.01379	-0.00000	$	20.13901	0.45822	-0.00000	0.24379	0.02279	-0.00000
[illegible]	[illegible]	[illegible]	0.34522	-0.00000	0.11919	0.01146	-0.00000	$	20.12456	0.33722	-0.00000	0.24295	0.01676	-0.00000
[illegible]	[illegible]	10.11667	-0.28291	0.00544	0.11667	-0.00334	0.00014	$	20.12485	-0.13653	-0.00723	0.24152	-0.00678	-0.00036
[illegible]	[illegible]	10.12140	0.28008	-0.00000	0.12140	0.00930	-0.00000	$	20.11957	0.31960	-0.00000	0.24297	0.01588	-0.00000
[illegible]	[illegible]	10.07191	0.11345	0.11345	0.07191	0.00377	0.00377	$	20.17033	0.11738	0.11738	0.24196	0.00582	0.00582
[illegible]	[illegible]	10.19261	0.0	-0.02850	0.16243	0.0	-0.00095	$	20.14156	0.0	-0.01290	0.24397	0.0	-0.00064
[illegible]	[illegible]	10.14493	0.16647	-0.16647	0.08899	0.00553	-0.00553	$	20.15524	0.10626	-0.10626	0.24423	0.00527	-0.00527

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TIME= 5000.00SEC ITIME= 100

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	10.14	0.13	0.03	-0.00	20.10	0.23	0.06	-0.00
2	10.16	0.16	0.01	-0.00	20.09	0.24	0.01	-0.00

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TIME= 5500.00SEC ITIME= 110

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	10.16	0.13	0.03	-0.00	20.12	0.23	0.03	-0.00
2	10.17	0.14	0.00	0.00	20.11	0.24	0.01	-0.00

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TIME= 6000.00SEC ITIME= 120

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	10.19	0.13	0.04	-0.00	20.14	0.23	0.03	-0.00
2	10.20	0.16	-0.00	0.00	20.13	0.24	0.00	0.00

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TIME = 6250.00 SEC DELTA T WAS, TINC = 50.00 SEC. TIME STEP, ITIME = 125

NET LAGOON VOLUME FOR LAYER 1, VOL1 = 0.1678756E+06
NET VOLUME ABOVE MLW, VOL2 = 0.2667102E+08 IPOINT= +1

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NODE	NEXT	DEPTH-1	XFLUX-1	YFLUX-1	ELEV-1	XVEL-1	YVEL-1		DEPTH-2	XFLUX-2	YFLUX-2	ELEV-2	XVEL-2	YVEL-2
1	1	10.17726	1.10047	-0.00001	0.17726	0.34111	-0.00000	$	20.17728	1.20179	-0.00001	0.35456	0.05956	-0.00000
2	2	10.17726	1.17327	-0.20406	0.17726	0.03225	-0.00693	$	20.17728	0.81541	-0.17179	0.35456	0.04047	-0.00851
3	3	10.17726	1.98091	-0.00001	0.17726	0.06566	-0.00000	$	20.17728	1.75902	-0.00001	0.35456	0.08718	-0.00000
4	4	10.18039	1.50749	-0.00001	0.18039	0.04995	-0.00000	$	20.17661	1.36893	-0.00001	0.35500	0.06785	-0.00000
5	5	10.19578	0.89641	-0.05972	0.19578	0.02971	-0.00195	$	20.16763	0.75105	-0.04838	0.35341	0.03724	-0.00240
6	6	10.18443	1.63272	-0.00001	0.18443	0.05409	-0.00000	$	20.16919	1.46068	-0.00000	0.35422	0.07242	-0.00000
7	7	10.18779	1.50008	-0.00001	0.18779	0.04967	-0.00000	$	20.16753	1.34535	-0.00001	0.35532	0.06671	-0.00000
8	8	10.19110	1.00087	-0.01243	0.19110	0.02752	-0.00041	$	20.15930	0.69292	-0.01010	0.35240	0.03437	-0.00050
9	9	10.19264	1.51032	-0.00000	0.19264	0.05001	-0.00000	$	20.14235	1.35621	-0.00000	0.35500	0.06726	-0.00000
10	10	10.19342	1.05447	-0.00001	0.19492	0.04817	-0.00000	$	20.16151	1.29293	-0.00001	0.35545	0.06413	-0.00000
11	11	10.23116	0.75634	0.00111	0.23116	0.02509	0.00004	$	20.15370	0.62908	-0.00126	0.35185	0.03122	-0.00006
12	12	10.19433	1.43564	-0.00000	0.19433	0.04754	-0.00000	$	20.15774	1.27403	-0.00000	0.35513	0.06320	-0.00000
13	13	10.19961	1.38245	-0.00001	0.19961	0.04611	-0.00000	$	20.15761	1.23158	-0.00001	0.35583	0.06110	-0.00000
14	14	10.20217	0.64776	-0.00415	0.20291	0.01277	-0.00016	$	20.14481	0.57443	-0.00298	0.35138	0.02851	-0.00015
15	15	10.20361	1.36376	-0.00100	0.20361	0.04515	-0.00000	$	20.15166	1.21144	-0.00000	0.35509	0.06012	-0.00000
16	16	10.20510	1.12412	-0.00001	0.20509	0.04183	-0.00000	$	20.15040	1.17550	-0.00001	0.35590	0.05834	-0.00000
17	17	10.20433	0.61641	0.00663	0.20433	0.02036	0.00022	$	20.14629	0.51779	0.00190	0.35059	0.02570	0.00009
18	18	10.20487	1.28417	-0.00000	0.20487	0.04244	-0.00000	$	20.14676	1.15800	-0.00009	0.35556	0.05748	-0.00000
19	19	10.20483	1.20751	-0.00001	0.20483	0.04173	-0.00000	$	20.15106	1.12136	-0.00001	0.35646	0.05565	-0.00000
20	20	10.20432	0.56092	-0.00171	0.20432	0.01741	-0.00039	$	20.14261	0.46569	-0.00266	0.35063	0.02312	-0.00013
21	21	10.27018	1.22014	-0.00000	0.20208	0.04342	-0.00000	$	20.14764	1.09464	-0.00000	0.35573	0.05433	-0.00000
22	22	10.20413	1.18679	-0.00001	0.20413	0.03323	-0.00000	$	20.15126	1.06103	-0.00001	0.35619	0.05265	-0.00000
23	23	10.20464	0.47172	0.00173	0.20864	0.01562	0.00022	$	20.14183	0.41550	0.00179	0.35031	0.02063	0.00009
24	24	10.22011	1.16517	-0.00000	0.22017	0.03457	-0.00000	$	20.14667	1.04538	-0.00009	0.35603	0.05189	-0.00000
25	25	10.22761	1.12816	-0.00001	0.22761	0.03714	-0.00000	$	20.14122	1.01211	-0.00000	0.35684	0.05023	-0.00000
26	26	10.22653	0.41667	0.00344	0.22653	0.01313	0.00017	$	20.14377	0.36391	0.00310	0.35027	0.01807	0.00015
27	27	10.21251	1.09416	-0.00000	0.21231	0.03635	-0.00000	$	20.14415	0.98982	-0.00030	0.35616	0.04912	-0.00000
28	28	10.21441	1.05561	-0.00001	0.21987	0.03478	-0.00000	$	20.14729	0.95944	-0.00000	0.35715	0.04762	-0.00000
29	29	10.22133	0.31102	-0.00465	0.22131	0.01746	-0.00017	$	20.14132	0.11589	-0.00335	0.35031	0.01568	-0.00017
30	30	10.21237	1.01399	-0.00000	0.21237	0.03374	-0.00000	$	20.14471	0.93734	-0.00000	0.35640	0.04653	-0.00000
31	31	10.22073	0.97645	-0.00000	0.22792	0.03242	-0.00000	$	20.14496	0.90535	-0.00000	0.35678	0.04508	-0.00000
32	32	10.21747	0.25612	0.00403	0.21747	0.03943	0.00021	$	20.14176	0.24552	0.00401	0.35063	0.01118	0.00020
33	33	10.21299	0.91179	-0.00000	0.21213	0.03150	-0.00000	$	20.14453	0.84915	-0.00000	0.35683	0.04474	-0.00000
34	34	10.21356	0.91617	-0.00001	0.21159	0.03181	-0.00000	$	20.14456	0.96237	-0.00000	0.35815	0.04281	-0.00000
35	35	10.22461	0.44441	-0.00151	0.22461	0.01612	-0.00031	$	20.14423	0.22129	-0.00167	0.35056	0.01098	-0.00008
36	36	10.21644	0.94124	-0.00000	0.21641	0.03241	-0.00000	$	20.14116	0.91570	-0.00000	0.35757	0.04149	-0.00000

37	37	30.20341	0.94154	-0.00000	0.20941	0.02786	-0.00030	$	20.14425	0.87558	-0.00000	0.35787	0.00344	-0.00000
38	38	30.21246	0.92136	0.00164	0.21246	0.00432	0.00012	$	20.13872	0.16870	0.00785	0.35120	0.00414	0.00038
39	39	30.21507	0.81876	-0.00100	0.21507	0.02704	-0.00000	$	20.14270	0.79939	-0.00000	0.35797	0.03369	-0.00000
40	40	30.21133	0.78153	-0.00000	0.21110	0.02597	-0.00000	$	20.14691	0.76946	-0.00000	0.35822	0.01119	-0.00000
41	41	30.20597	0.05220	0.00137	0.20597	0.00173	0.00005	$	20.14451	0.12932	-0.00045	0.35180	0.00442	-0.00004
42	42	30.21274	0.74106	-0.00000	0.21274	0.02053	-0.00000	$	20.14536	0.74307	-0.00000	0.35909	0.03349	-0.00000
43	43	30.21751	0.71132	-0.00000	0.21751	0.02354	-0.00000	$	20.14272	0.71920	-0.00000	0.35825	0.03571	-0.00000
44	44	30.21101	-0.01942	-0.00149	0.21101	-0.01066	-0.00006	$	20.14190	0.07788	0.00029	0.35191	0.13987	0.00091
45	45	30.22299	0.69025	-0.00000	0.22289	0.02243	-0.00002	$	20.13567	0.70122	-0.00000	0.35905	0.01482	-0.00000
46	46	30.20474	0.64439	-0.00000	0.20474	0.02133	-0.00000	$	20.15399	0.68300	-0.00000	0.35493	0.01190	-0.00000
47	47	30.21914	-0.07622	0.00764	0.21411	-0.01252	0.00025	$	20.13376	0.03392	0.00405	0.35294	0.00156	0.00050
48	48	30.21393	0.60693	-0.00000	0.21391	0.02099	-0.00000	$	20.14562	0.66018	-0.00000	0.35695	0.01277	-0.00000
49	49	30.21497	0.58111	-0.00000	0.21437	0.01921	-0.00000	$	20.14171	0.63097	-0.00000	0.35867	0.03132	-0.00000
50	50	30.20797	-0.15704	-0.00140	0.20797	-0.00520	-0.00005	$	20.14569	-0.00403	-0.00284	0.35394	-0.00020	-0.00014
51	51	30.21744	0.55157	-0.00000	0.21744	0.01925	-0.00000	$	20.14101	0.61160	-0.00000	0.35804	0.03046	-0.00000
52	52	30.21398	0.51045	-0.00000	0.21138	0.01649	-0.00000	$	20.14513	0.56280	-0.00000	0.35407	0.02794	-0.00000
53	53	30.21516	-0.21923	0.01114	0.21516	-0.00724	0.00016	$	20.14149	-0.36819	0.00422	0.35413	-0.00139	0.00021
54	54	30.21961	0.48742	-0.00000	0.21861	0.01615	-0.00000	$	20.14171	0.55101	-0.00000	0.35934	0.02136	-0.00000
55	55	30.18666	0.41954	-0.00000	0.18666	0.01190	-0.00000	$	20.17103	0.49287	-0.00000	0.35970	0.02441	-0.00000
56	56	30.20492	-0.31389	-0.00425	0.20492	-0.01039	-0.00014	$	20.14673	-0.15006	0.00122	0.35565	-0.00745	0.00006
57	57	30.19197	0.34290	-0.00000	0.19129	0.01191	-0.00000	$	20.16910	0.46735	-0.00000	0.35939	0.02317	-0.00000
58	58	30.17323	0.37001	-0.00000	0.17323	0.01226	-0.00000	$	20.19562	0.34907	-0.00000	0.35486	0.01729	-0.00000
59	59	30.17274	-0.44505	0.01448	0.17274	-0.01479	0.00041	$	20.18455	-0.25425	0.00742	0.35770	-0.01260	0.00017
60	60	30.17540	0.24076	-0.00000	0.17540	0.00440	-0.00000	$	20.19365	0.33681	-0.00000	0.35945	0.01661	-0.00000
61	61	30.11435	0.13449	0.13449	0.11435	0.00447	0.00447	$	20.28443	0.15781	0.15781	0.35878	0.00780	0.00780
62	62	30.14253	0.0	-0.01043	0.14253	0.0	-0.00042	$	20.21748	0.0	0.02115	0.36002	0.0	0.00105
63	63	30.13438	0.21297	-0.21297	0.13438	0.00707	-0.00707	$	20.22104	0.18227	-0.18227	0.35942	0.00704	-0.00704

* *

TIME= 6510.COSEC ITIME= 130

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.22	0.20	0.02	-0.03	20.16	0.35	0.01	-0.00
2	30.23	0.22	-0.00	0.00	20.15	0.35	0.00	0.00

* *

* *

TIME= 7000.COSEC ITIME= 140

INTERPOLATION PT	DEPTH-1	ELEV-1	XVEL-1	YVEL-1	DEPTH-2	ELEV-2	XVEL-2	YVEL-2
1	30.25	0.20	0.03	-0.00	20.19	0.35	0.03	-0.00
2	30.26	0.22	-0.00	-0.00	20.16	0.35	0.00	-0.00

* *

etc.

Listing of Punched Nodal Fluxes and Elevations for "hot starting" purposes for Example 1. ITIME = 400, TIME = 20,000 seconds.

Flux data. Data is punched in pairs of x and y flux components for each node in internal numbering order.

Layer 1 (Bottom)

[illegible]3293	-0.00000	0.26327	-0.30042	1.37055	-0.00000	0.55056	-0.00000
[illegible]23177	-0.17870	0.79520	-0.00000	0.64701	-0.00000	0.21117	-0.04112
[illegible]3200	-0.00000	0.70927	-0.00000	0.18191	0.02087	0.55145	-0.00000
[illegible]4104	-0.00000	0.14632	-0.02681	0.54093	-0.00000	0.66350	-0.00000
[illegible]13137	0.02587	0.56255	-0.00000	0.69300	-0.00000	0.08056	-0.01234
[illegible]1922	-0.00000	0.64866	-0.00000	0.07024	0.00336	0.56128	-0.00000
[illegible]0313	-0.00000	0.02118	0.01705	0.54196	-0.00000	0.66258	-0.00000
[illegible]9818	-0.02703	0.53532	-0.00000	0.68703	-0.00000	-0.04607	0.03895
[illegible]7658	-0.00000	0.69026	-0.00000	-0.09043	-0.02648	0.50977	-0.00000
[illegible]6107	-0.00000	-0.12189	0.02457	0.57511	-0.00000	0.69870	-0.00000
[illegible]4229	0.00604	0.51109	-0.00000	0.64077	-0.00000	-0.20673	-0.00167
[illegible]5049	-0.00000	0.66052	-0.00000	-0.26554	0.04123	0.50000	-0.00000
[illegible]2048	-0.00000	-0.31295	-0.01587	0.49748	-0.00000	0.57891	-0.00000
[illegible]706	0.05079	0.48704	-0.00000	0.55383	-0.00000	-0.45864	-0.00862
[illegible]595	-0.00000	0.51518	-0.00000	-0.56256	0.09077	0.27861	-0.00000
[illegible]416	0.00416	0.0	-0.05177	0.44723	-0.44723		

Layer 2 (Top)

[illegible]1553	-0.00001	0.52005	-0.39562	2.92763	-0.00001	1.84944	-0.00001
[illegible]241	-0.22479	2.23115	-0.00001	2.00159	-0.00001	0.44364	-0.04647
[illegible]345	-0.00001	2.05343	-0.00001	0.41174	0.01067	1.87998	-0.00001
[illegible]38	-0.00001	0.36535	-0.01686	1.82598	-0.00001	1.90390	-0.00001
[illegible]323	0.01499	1.78732	-0.00001	1.84986	-0.00001	0.27922	-0.00647
[illegible]617	-0.00001	1.74199	-0.00001	0.24553	0.00171	1.64146	-0.00001
[illegible]92	-0.00001	0.13887	0.01359	1.53496	-0.00000	1.57876	-0.00001
[illegible]73	-0.01980	1.45471	-0.00000	1.50497	-0.00001	0.09483	0.03042
[illegible]35	-0.00000	1.41975	-0.00001	0.03603	-0.02115	1.26241	-0.00000
[illegible]6	-0.00001	-0.00540	0.02011	1.20761	-0.00000	1.23452	-0.00001
[illegible]57	0.00303	1.08058	-0.00000	1.12535	-0.00001	-0.12707	-0.00117
[illegible]56	-0.00000	1.04106	-0.00000	-0.18681	0.02957	0.91951	-0.00000
[illegible]55	-0.00000	-0.25221	-0.00777	0.81153	-0.00000	0.82118	-0.00000
[illegible]1	0.03495	0.75625	-0.00000	0.74437	-0.00000	-0.42251	0.00365
[illegible]34	-0.00000	0.54065	-0.00000	-0.55687	0.04460	0.43702	-0.00000
[illegible]49	0.18648	0.0	0.03091	0.31779	-0.31779		

Elevation data. Data is punched at each node in internal order.

Layer 1 (Bottom)

[illegible]	30.97043	30.97043	30.95976	30.99210	30.96747	30.94122	31.01369
[illegible]	30.92213	31.02299	30.94046	30.91516	31.03821	30.92342	30.88979
[illegible]	30.90297	30.87349	31.05591	30.88690	30.86594	31.06384	30.87207
[illegible]	31.07657	30.85585	30.83852	31.06978	30.83725	30.82883	31.07466
[illegible]	30.82317	31.08002	30.82513	30.82359	31.06879	30.82947	30.83925
[illegible]	30.84273	30.83783	31.06718	30.83551	30.84322	31.04883	30.84654
[illegible]	31.04018	30.85368	30.85651	31.02699	30.85451	30.86235	30.98682
[illegible]	30.88834	30.93327	30.87500	30.87331	30.85011	30.88649	

(continued from page 33)

Layer 2 (Top)

20.97044	20.97044	20.97044	20.99148	20.94986	20.97685	21.00826	20.92796
20.98878	21.01976	20.92055	21.01099	21.03876	20.90515	21.01999	21.05672
20.89211	21.05017	21.08037	20.88963	21.06448	21.08804	20.98197	21.07950
21.10884	20.87115	21.10320	21.12236	20.87712	21.11374	21.12262	20.87473
21.11975	21.13904	20.86858	21.12988	21.13242	20.98182	21.13118	21.11908
20.88393	21.11864	21.12375	20.88405	21.12199	21.11081	20.90402	21.12016
21.10684	20.91264	21.10275	21.09700	20.92691	21.11273	21.09581	20.96861
21.09755	21.06908	21.02403	21.08615	21.07040	21.10980	21.08653	

Partial Listing of Punched Velocities for Example 1.

For each layer, data is punched in pairs of x and y velocity components for each node in internal node numbering order. Velocities for the upper layer are first in each set of velocities.

50 ITIME = 50, TIME = 2500 seconds

layer 2 (top)

0.030	-0.000	0.027	-0.001	0.033	-0.000	0.030	-0.000
0.025	-0.000	0.031	-0.000	0.029	-0.000	0.024	-0.000
0.029	-0.000	0.028	-0.000	0.023	-0.000	0.028	-0.000
0.027	-0.000	0.022	-0.000	0.027	-0.000	0.026	-0.000
0.020	-0.000	0.026	-0.000	0.024	-0.000	0.019	-0.000
0.024	-0.000	0.023	-0.000	0.018	-0.000	0.023	-0.000
0.022	-0.000	0.017	0.000	0.022	-0.000	0.021	-0.000
0.016	-0.000	0.021	-0.000	0.020	-0.000	0.015	-0.000
0.020	-0.000	0.019	-0.000	0.014	-0.000	0.019	-0.000
0.017	-0.000	0.013	-0.000	0.017	-0.000	0.016	-0.000
0.011	-0.000	0.016	-0.000	0.015	-0.000	0.010	-0.000
0.015	-0.000	0.014	-0.000	0.009	0.000	0.014	-0.000
0.013	-0.000	0.008	-0.000	0.013	-0.000	0.011	-0.000
0.007	0.000	0.011	-0.000	0.010	-0.000	0.005	-0.000
0.010	-0.000	0.007	-0.000	0.003	-0.000	0.007	-0.000

layer 1 (bottom)

0.001	0.001	0.0	0.000	0.001	-0.001		
0.026	-0.000	0.023	-0.001	0.029	-0.000	0.026	-0.000
0.022	-0.000	0.026	-0.000	0.025	-0.000	0.021	-0.000
0.025	-0.000	0.024	-0.000	0.020	0.000	0.024	-0.000
0.023	-0.000	0.019	-0.000	0.023	-0.000	0.022	-0.000
0.014	0.000	0.021	-0.000	0.021	-0.000	0.017	0.000
0.020	-0.000	0.019	-0.000	0.016	0.000	0.019	-0.000
0.018	-0.000	0.015	0.000	0.018	-0.000	0.017	-0.000
0.014	-0.000	0.017	-0.000	0.016	-0.000	0.012	0.000
0.016	-0.000	0.015	-0.000	0.012	0.000	0.015	-0.000
0.014	-0.000	0.010	0.000	0.014	-0.000	0.012	-0.000
0.009	0.000	0.012	-0.000	0.011	-0.000	0.008	-0.000
0.011	-0.000	0.010	-0.000	0.007	0.000	0.010	-0.000
0.009	-0.000	0.006	-0.000	0.009	-0.000	0.008	-0.000
0.004	0.000	0.007	-0.000	0.005	-0.000	0.003	-0.000
0.005	-0.000	0.003	-0.000	0.000	0.000	0.003	-0.000
0.000	0.000	0.0	-0.000	0.001	-0.001		

150 ITIME = 150, TIME = 7500 seconds

layer 2 (top)

0.072	-0.000	0.049	-0.010	0.106	-0.000	0.082	-0.000
0.045	-0.003	0.089	-0.000	0.091	-0.000	0.042	-0.000
0.082	-0.000	0.079	-0.000	0.038	-0.000	0.077	-0.000
0.075	-0.000	0.035	0.000	0.074	-0.000	0.072	-0.000
0.032	-0.000	0.070	-0.000	0.058	-0.000	0.029	-0.000
0.066	-0.000	0.065	-0.000	0.026	-0.000	0.063	-0.000

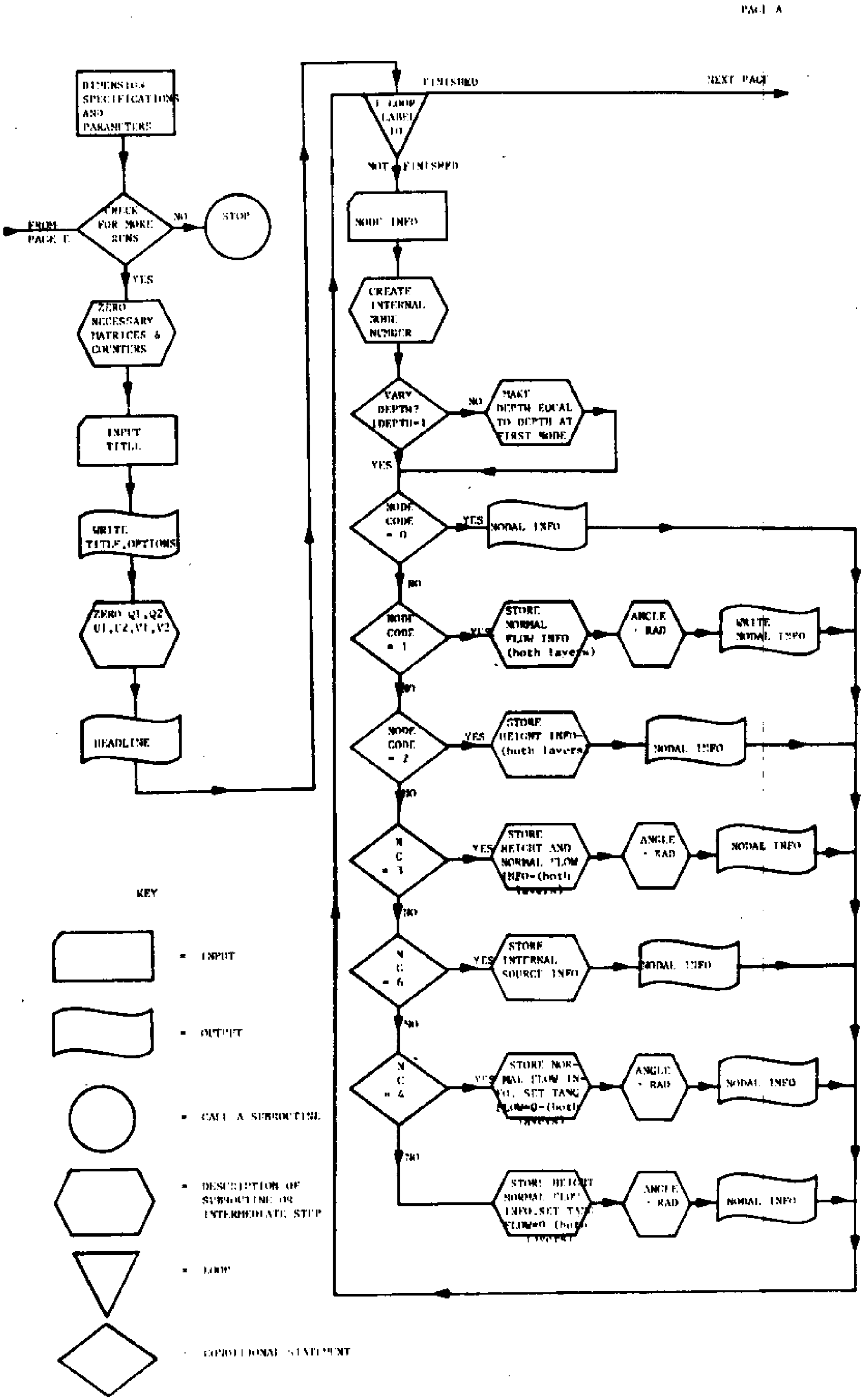
(continued from page 35)

0.062	-0.000	0.023	0.000	0.061	-0.000	0.059	-0.000
0.020	-0.000	0.057	-0.000	0.056	-0.000	0.018	0.000
0.055	-0.000	0.053	-0.000	0.015	0.000	0.052	-0.000
0.050	-0.000	0.012	0.000	0.049	-0.000	0.048	-0.000
0.010	-0.000	0.046	-0.000	0.045	-0.000	0.007	0.000
0.043	-0.000	0.042	-0.000	0.004	0.000	0.041	-0.000
0.038	-0.000	0.002	0.000	0.037	-0.000	0.034	-0.000
-0.003	0.000	0.033	-0.000	0.029	-0.000	-0.007	0.000
0.027	-0.000	0.020	-0.000	-0.014	0.000	0.019	-0.000
0.009	0.009	0.0	0.001	0.008	-0.008		

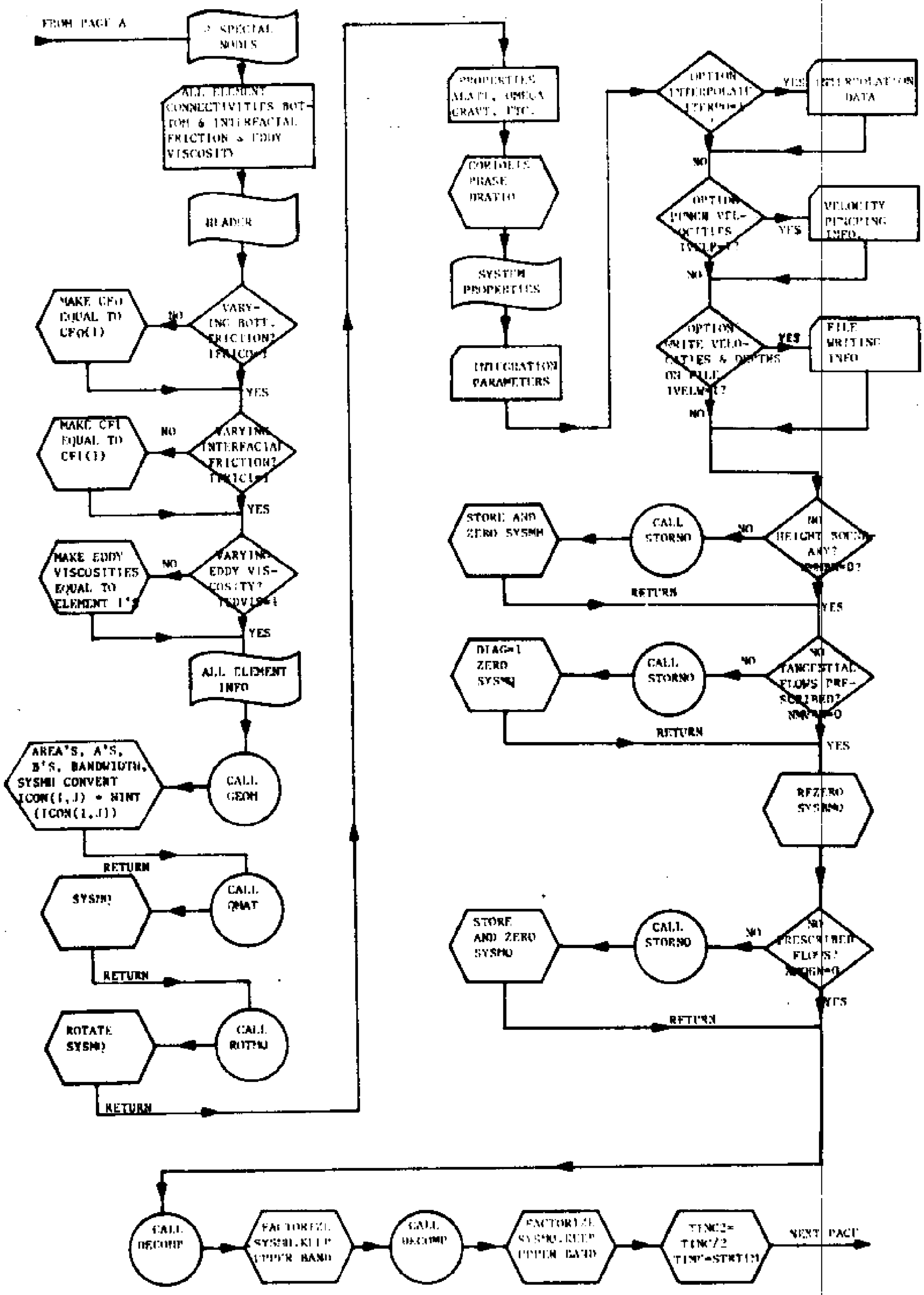
layer 1 (bottom)

0.051	-0.000	0.039	-0.008	0.078	-0.000	0.059	-0.000
0.036	-0.003	0.064	-0.000	0.059	-0.000	0.034	-0.000
0.059	-0.000	0.057	-0.000	0.031	-0.000	0.056	-0.000
0.055	-0.000	0.028	0.000	0.054	-0.000	0.053	-0.000
0.026	-0.000	0.051	-0.000	0.050	-0.000	0.023	0.000
0.049	-0.000	0.048	-0.000	0.021	-0.000	0.046	-0.000
0.045	-0.000	0.018	0.000	0.044	-0.000	0.042	-0.000
0.015	-0.000	0.041	-0.000	0.040	-0.000	0.013	0.000
0.039	-0.000	0.037	-0.000	0.010	0.000	0.036	-0.000
0.034	-0.000	0.007	0.000	0.033	-0.000	0.032	-0.000
0.004	0.000	0.031	-0.000	0.029	-0.000	0.002	-0.000
0.028	-0.000	0.027	-0.000	-0.001	0.000	0.025	-0.000
0.024	-0.000	-0.003	0.000	0.023	-0.000	0.021	-0.000
-0.006	0.000	0.020	-0.000	0.018	-0.000	-0.010	-0.000
0.017	-0.000	0.015	-0.000	-0.015	0.001	0.012	-0.000
0.005	0.005	0.0	-0.001	0.008	-0.008		

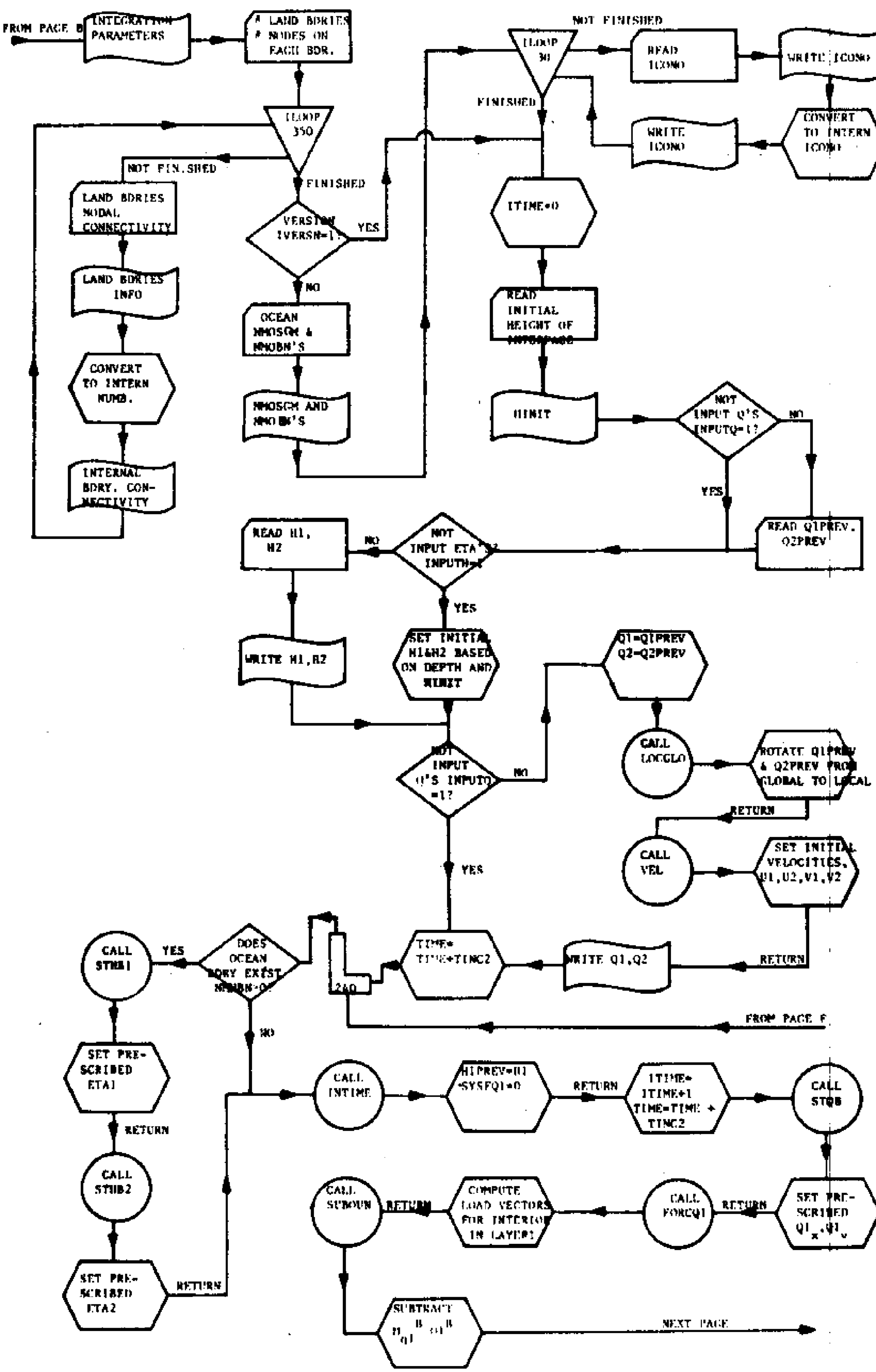
5.0 Flow Chart for "CAFE-2"

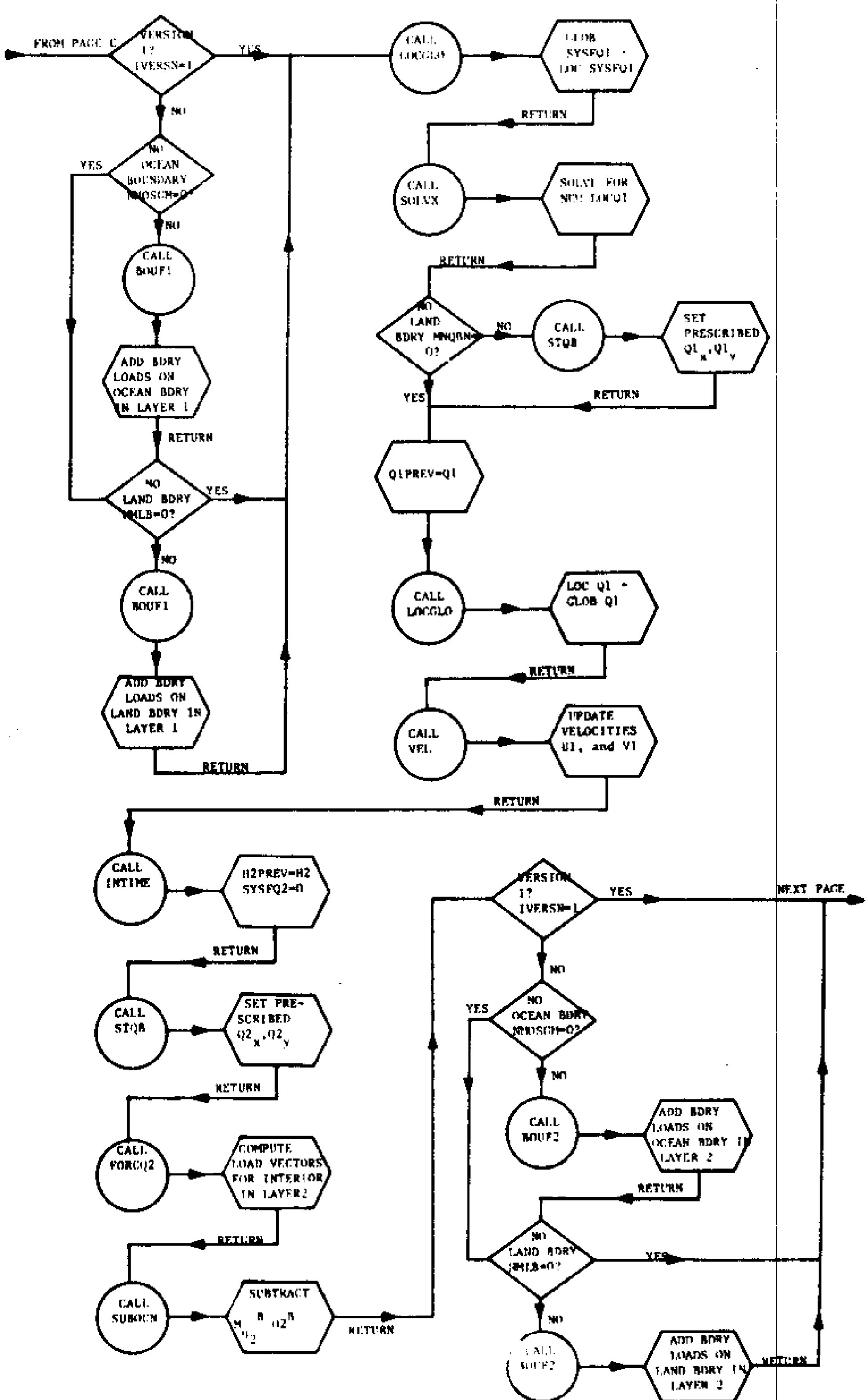


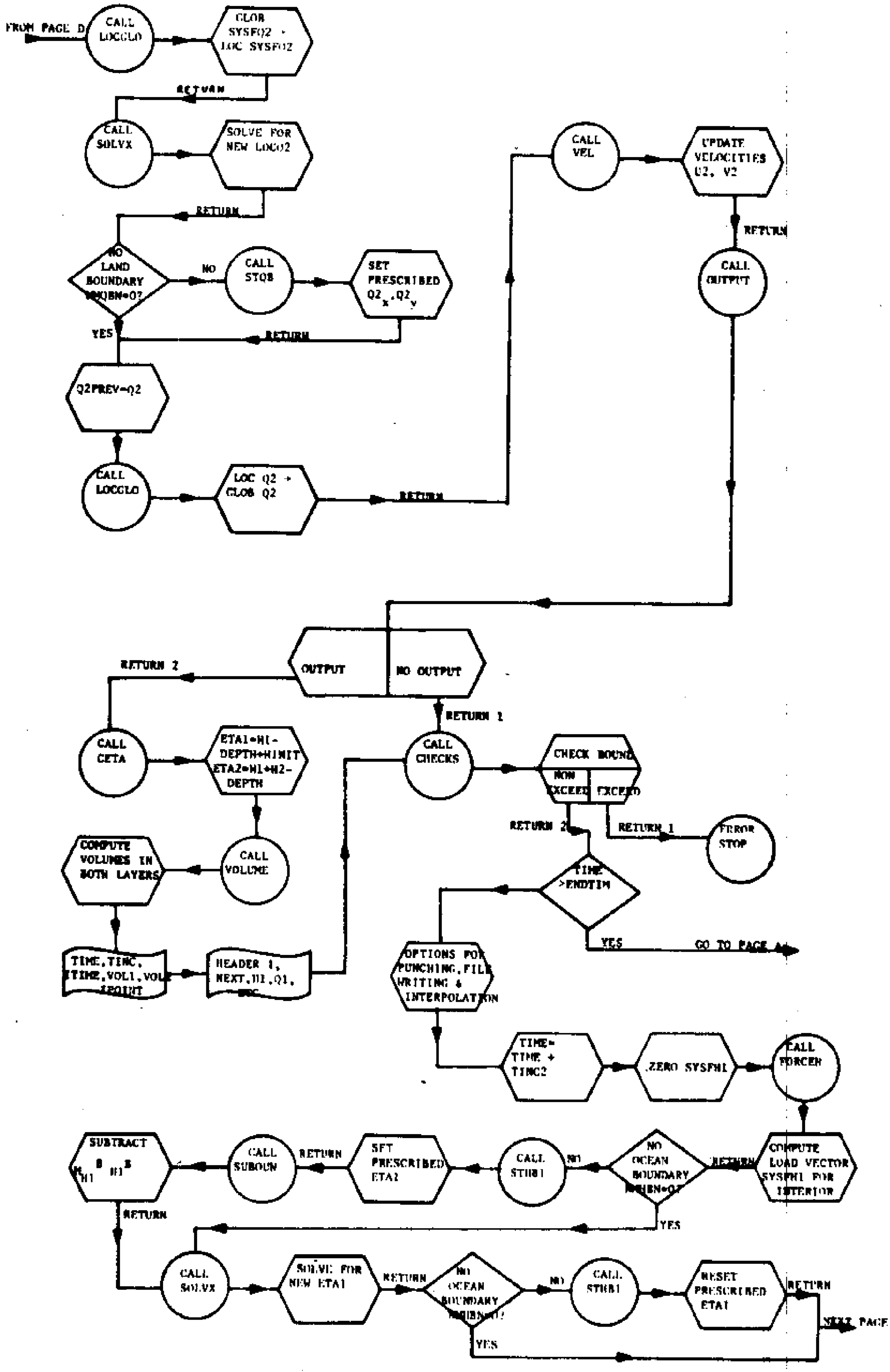
PAGE B



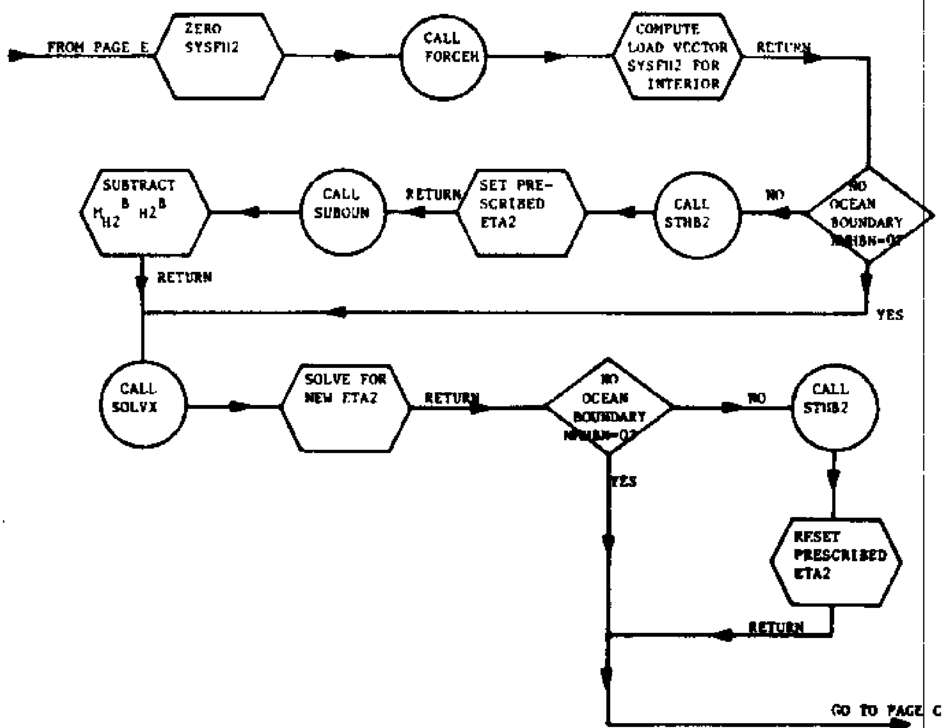
FROM PAGE A
SPECIAL NODES
ALL ELEMENT CONNECTIVITIES BOTTOM & INTERFACIAL FRICTION & EDDY VISCOSITY
HEADER
MAKE CFO EQUAL TO CFO(1)
NO
VARYING BOTT. FRICTION?
YES
MAKE CFI EQUAL TO CFI(1)
NO
VARYING INTERFACIAL FRICTION?
YES
MAKE EDDY VISCOSITIES EQUAL TO ELEMENT 1'S
NO
VARYING EDDY VISCOSITY?
YES
ALL ELEMENT INFO
AREA'S, A'S, B'S, BANDWIDTH, SYSMI CONVERT ICON(I,J) = NINT (ICON(I,J))
CALL GEOM
RETURN
CALL QMAT
RETURN
ROTATE SYSMI
CALL ROTMU
RETURN
PROPERTIES
SYSTEM PROPERTIES
INTEGRATION PARAMETERS
YES
INTERPOLATION DATA
NO
OPTION PUNCH VELOCITIES
YES
VELOCITY PUNCHING INFO.
NO
OPTION WRITE VELOCITIES & DEPTHS ON FILE
YES
FILE WRITING INFO
NO
STORE AND ZERO SYSMH
CALL STORNO
NO
HEIGHT BOUNDARY?
RETURN
YES
ZERO
CALL STORNO
NO
TANGENTIAL FLOWS PRESCRIBED?
RETURN
YES
REZERO
STORE AND ZERO SYSMO
CALL STORNO
NO
PRESCRIBED FLOWS?
YES
RETURN
CALL DECOMP
FACTORIZE SYSMI, KEEP UPPER BAND
CALL DECOMP
FACTORIZE SYSMO, KEEP UPPER BAND
NEXT PAGE


FROM PAGE B
INTEGRATION PARAMETERS
LAND BDRIES # NODES ON EACH BDR.
ILOOP 350
NOT FINISHED
FINISHED
LAND BDRIES NODAL CONNECTIVITY
LAND BDRIES INFO
CONVERT TO INTERN NUMB.
INTERNAL BDRY. CONNECTIVITY
VERSION IVERSN=1?
YES
NO
OCEAN NMOSGM & NMOBN'S
NMOSGM AND NMOBN'S
ILOOP 30
NOT FINISHED
FINISHED
READ ICONO
WRITE ICONO
CONVERT TO INTERN ICONO
WRITE ICONO
ITIME=0
READ INITIAL HEIGHT OF INTERFACE
HINIT
NOT INPUT Q'S INPUTQ=1?
NO
YES
READ Q1PREV, Q2PREV
NOT INPUT ETA'S? INPUTH=1
NO
YES
READ H1, H2
WRITE H1,H2
SET INITIAL H1&H2 BASED ON DEPTH AND HINIT
Q1=Q1PREV Q2=Q2PREV
CALL LOCGLO
ROTATE Q1PREV & Q2PREV FROM GLOBAL TO LOCAL
RETURN
NOT INPUT Q'S INPUTQ =1?
NO
YES
CALL VEL
SET INITIAL VELOCITIES, U1,U2,V1,V2
RETURN
WRITE Q1,Q2
TIME= TIME+TINC2
260
FROM PAGE F
DOES OCEAN BDRY EXIST NMOBN>0?
YES
NO
CALL STHB1
SET PRESCRIBED ETA1
RETURN
CALL STHB2
SET PRESCRIBED ETA2
RETURN
CALL INTIME
H1PREV=H1 SYSFQ1=0
RETURN
ITIME= ITIME+1 TIME=TIME + TINC2
CALL STQB
SET PRESCRIBED Q1x,Q1y
RETURN
CALL FORCQ1
COMPUTE LOAD VECTORS FOR INTERIOR IN LAYER1
RETURN
CALL SUBOUN
SUBTRACT HQ1B QQ1B
NEXT PAGE


FROM PAGE C
VERSION 1? IVERSN=1
YES
NO
NO OCEAN BOUNDARY NNOSCH=0?
CALL BOUF1
ADD BDRY LOADS ON OCEAN BDRY IN LAYER 1
RETURN
NO LAND BDRY NMLB=0?
CALL BOUF1
ADD BDRY LOADS ON LAND BDRY IN LAYER 1
CALL LOCGLO
GLOB SYSFQ1 = LOC SYSFQ1
CALL SOLVX
SOLVE FOR NEW LOCQ1
NO LAND BDRY NNQBN=0?
CALL STQB
SET PRESCRIBED $Q1_x$,$Q1_y$
Q1PREV=Q1
LOC Q1 = GLOB Q1
CALL VEL
UPDATE VELOCITIES U1, and V1
CALL INTIME
H2PREV=H2 SYSFQ2=0
CALL STQB
SET PRE-SCRIBED $Q2_x$,$Q2_y$
CALL FORCQ2
COMPUTE LOAD VECTORS FOR INTERIOR IN LAYER2
CALL SUBOUN
SUBTRACT M_{Q2}^B $Q2^B$
VERSION 1? IVERSN=1
NEXT PAGE
NO OCEAN BDRY NNOSCH=0?
CALL BOUF2
ADD BDRY LOADS ON OCEAN BDRY IN LAYER 2
NO LAND BDRY NMLB=0?
CALL BOUF2
ADD BDRY LOADS ON LAND BDRY IN LAYER 2


FROM PAGE D
CALL LOCGLO
GLOB SYSFQ2 → LOC SYSFQ2
RETURN
CALL SOLVX
SOLVE FOR NEW LOCQ2
RETURN
NO LAND BOUNDARY NQIBN=0?
NO
CALL STQB
SET PRESCRIBED $Q2_x, Q2_y$
YES
RETURN
Q2PREV=Q2
CALL LOCGLO
LOC Q2 → GLOB Q2
RETURN
CALL VEL
UPDATE VELOCITIES U2, V2
RETURN
CALL OUTPUT
OUTPUT
NO OUTPUT
RETURN 2
RETURN 1
CALL CETA
ETA1=H1-DEPTH+HINIT
ETA2=H1+H2-DEPTH
CALL VOLUME
COMPUTE VOLUMES IN BOTH LAYERS
TIME,TINC,ITIME,VOL1,VOL2 IPOINT
HEADER 1, NEXT,H1,Q1, etc.
CALL CHECKS
CHECK BOUND
NON EXCEED
EXCEED
RETURN 2
RETURN 1
ERROR STOP
TIME >ENDTIM
YES
GO TO PAGE A
OPTIONS FOR PUNCHING,FILE WRITING & INTERPOLATION
TIME= TIME + TINC2
ZERO SYSFH1
CALL FORCEH
COMPUTE LOAD VECTOR SYSFH1 FOR INTERIOR
RETURN
NO OCEAN BOUNDARY NHIBN=0?
NO
CALL STHB1
SET PRESCRIBED ETA1
RETURN
CALL SUBOUN
SUBTRACT $M_{H1}^B H1^B$
RETURN
YES
CALL SOLVX
SOLVE FOR NEW ETA1
RETURN
NO OCEAN BOUNDARY NHIBN=0?
NO
CALL STHB1
RESET PRESCRIBED ETA1
RETURN
NEXT PAGE
YES

PAGE F


FROM PAGE E
ZERO SYSFH2
CALL FORCEH
COMPUTE LOAD VECTOR SYSFH2 FOR INTERIOR
RETURN
NO OCEAN BOUNDARY NMHBN=0?
NO
YES
CALL STHB2
SET PRE-SCRIBED ETA2
RETURN
CALL SUBOUN
SUBTRACT
RETURN
CALL SOLVX
SOLVE FOR NEW ETA2
RETURN
NO OCEAN BOUNDARY NMHBN=0?
NO
YES
CALL STHB2
RESET PRESCRIBED ETA2
RETURN
GO TO PAGE C

```
      DIMENSION TITLE(20),TEXT1(3,2),TEXT2(2,2),TEXT3(2,2),
     1 ICON(81,3),A(81,3),B(81,3),AREA(81,3),
     2 NEXT(64),NINT(64),YORD(64),XCRD(64),DEPTH(64),NBC(64),
     3 SYSMH(64,5),SYSMQ(128,10),
     4 H1(64),H2(64),Q1(128),Q2(128),H1PREV(64),H2PREV(64),
     5 Q1PREV(128),Q2PREV(128),SYSPH(64),SYSPQ(128),SYSPHB(64),
     6 SYSPQB(128),SYSBMH(6,5),SYSBMQ(86,10),NHN(3),NQN(43),
     7 NVN(43),HB1(3),HB2(3),ALAG1(3),ALAG2(3),QB1(43),QB2(43),
     8 QBANG(43),SOX(64),SOY(64),PSPLUS(64),CORX(64),CORY(64),
     9 CPO(81),CP1(81),EDXX(81),EDYY(81),EDXY(81)
      DIMENSION U1(64),V1(64),U2(64),V2(64),S1X(64),S1Y(64),
     1 NNLBN(1),ICONL(1,43),NNCEN(1),ICCNC(1,3),CX(64),CY(64),
     2 CXY(64),ETA1(64),ETA2(64),TAU2X(64),TAU2Y(64)
      DIMENSION NFLCX(1),PLUX(1),XM(2),YM(2),LIBW(7),GAMW(7),
     1 XW(7),YW(7),TT(7)
      COMMON/SCRTNO/K1,K2,K3
      COMMON/CGRID/NNNP,NNNEZ,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXQBM,MAXHBM
      COMMON/CINTF/MAXPT
      COMMON/COUTP/NOUT
      COMMON/CINTEG/TIME,TINC,EKFACT,RKFAC,ISTEP,PHASE,ITIME
      COMMON/COPT/IFRICO,IFRIC1,IEDVIS,ICNVEC,IWINC,IVERSN
      COMMON/CFRCE/GRAVT,CORIO,DENST1,DENST2,G24,DRATIO
      COMMON/CWIND/WTIME,WMAG,WDIR,MAXWI,STRTIM
      DATA TEXT1,TEXT2,TEXT3/4HVARY,4HCONS,4HSET ,3HING,4HTANT,4HTO 0,
     1 4HSET ,4HREAD,4HTO C,3H IN,4HIGNO,4HINCL,4HRED ,4HUDED/
      MAXEL=81
      MAXNOD=64
      MAXBWH=5
      MAXNQ=2*MAXNOD
      MAXBWQ=2 *MAXBWH
      MAXHBN=3
      MAXHBM=MAXHBN*2
      MAXQBN=43
      MAXQBM=MAXQBN*2
      MAXSGM=1
      MAXL=43
      MAXOSB=1
      MAXO=3
      MAXPT=2
      MAXWI=7
      IPOINT=-1
  320 NBANDH=0
      READ(5,1001)IVERSN,NNEL,NNNP,IFRICO,IFRIC1,IDEPTH,IEDVIS,
     1  IWIND,ICNVEC,INPUTH,INPUTQ
 1001 FORMAT(16I5)
      IF(IVERSN .EQ. 0) STOP
      LENGTH=MAXNOD*MAXBWH
      CALL AMATZR(SYSMH,LENGTH)
      LENGTH=MAXNQ*MAXBWQ
      CALL AMATZR(SYSMQ,LENGTH)
      LENGTH=MAXHBM*MAXBWH
      CALL AMATZR(SYSBMH,LENGTH)
      LENGTH=MAXQBM*MAXBWQ
      CALL AMATZR(SYSBMQ,LENGTH)
      CALL AMATZR(PSPLUS,NNNP)
      CALL AMATZR(Q1PREV,MAXNQ)
      CALL AMATZR(Q2PREV,MAXNQ)
      TUPI=6.28318
      NMHBN=0
      NMVBN=0
      NMQBN=0
      IPLUX=0
      READ(5,1003) TITLE
 1003 FORMAT(20A4)
      WRITE(6,1002) TITLE
 1002 FORMAT(1H //1H ,25X,20A4)
      CALL SLINE(36)
      WRITE(6,1004)NNEL,NNNP,IVERSN,
     1  (TEXT1(IFRICO,I), I=1,2),(TEXT1(IFRIC1,I), I=1,2),
     2  (TEXT1(IDEPTH,I),I=1,2),(TEXT1(IEDVIS,I),I=1,2),
```

```
     3  (TEXT1(IKINE,I),I=1,2),(TEXT2(INPUTR,I),I=1,2),
     4  (TEXT2(INPUTC,I),I=1,2),(TEXT3(ICNVEC,I),I=1,2)
 1004 FORMAT(1H0,5X,'THIS PROBLEM HAS THE FOLLOWING CHARACTERISTICS:'/
     1  1H0,10X,'NUMBER OF ELEMENTS, NMEL = ',I5/1H ,
     2  10X,'NUMBER OF NODES, NMNP = ',I5/1H ,
     3  10X,'THE MODEL APPLIED IS VERSION ',I1/1H ,
     4  10X,'IT IS ASSUMED THAT SPATIALLY,'/1H ,
     5  40X,'BOTTOM SHEAR COEFFICIENT IS ',2A4/1H ,
     5  40X,'INTERFACE SHEAR COEFFICIENT IS ',2A4/1H ,
     6  40X,'MEAN LOW WATER DEPTH IS ',2A4/1H ,
     7  40X,'EDDY VISCOSITY IS ',2A4/1H ,
     8  40X,'WIND STRESS IS ',2A4,2X,'IN TIME AND IS SPATIALLY CONSTANT'
     9/1H ,10X,'INITIAL VALUES OF H ARE ',2A4/1H ,
     A  10X,'INITIAL VALUES OF Q ARE ',2A4/1H ,
     B  10X,'CONVECTIVE ACCELERATIONS ARE ',2A4/1H )
      CALL SLINE(36)
      NMNP2=NMNP*2
      CALL AMATZE(Q1,NMNP2)
      CALL AMATZE(Q2,NMNP2)
      CALL AMATZE(U1,NMNP)
      CALL AMATZE(V1,NMNP)
      CALL AMATZE(U2,NMNP)
      CALL AMATZE(V2,NMNP)
      WRITE(6,1010)
 1010 FORMAT(1H0,6X,'NODE',7X,'X-',10X,'Y-',7X,'DEPTH',4X,
     1  'NODE',4X,'INTFA.',3X,'TIME',3X,'SURFA.',3X,'TIME',3X,
     2  'X-FLUX',3X,'X-FLUX',3X,'FLUX',5X,'Y-',5X,'SOURCE'/
     3  1H ,5X,'NUMBER',2X,'COORDINATE',2X,'COORDINATE',3X,
     4  '(BLW)',4X,'CODE',4X,'AMPLI.',3X,'LAG',4X,'AMPLI.',
     5  3X,'LAG',4X,'LAY. 1',3X,'LAY. 2',3X,'ANGLE',3X,
     6  'FLUX',5X,'FLUX'/1H ,16X,'(M)',9X,'(M)',8X,'(M)',
     7  14X,'(M)',5X,'(SEC)',3X,'(M)',5X,'(SEC)',2X,'(M2/S)',
     8  3X,'(M2/S)',3X,'(DEG)',3X,'(M2/S)',2X,'(M/S)'/1H0)
      DO 10 I=1,NMNP
      READ(5,1005) NEXT(I),NBC(I),XORD(I),YORD(I),DEPTH(I),DUM1,DUM2,
     1  DUM3,DUM4,DUM5,DUM6,IDEP7,DUM8
 1005 FORMAT(2I5,3F10.0,8F5.0)
      NINT(NEXT(I))=I
      I1=NBC(I)
      N=NEXT(I)
      IF(IDEPTH .EQ. 1) GO TO 60
      DEPTH(I)=DEPTH(1)
   60 IF(I1 .EQ. 0) GO TO 70
      IF(I1 .EQ. 1) GO TO 80
      IF(I1 .EQ. 2) GO TO 90
      IF(I1 .EQ. 3) GO TO 100
      IF(I1 .EQ. 6) GO TO 50
      IF(I1 .EQ. 4) GO TO 110
      NMHBN=NMHBN+1
      NMQBN=NMQBN+1
      NMVBN=NMVBN+1
      NHN(NMHBN)=I
      NQN(NMQBN)=I
      NVN(NMVBN)=I
      HB1(NMHBN)=DUM1
      ALAG1(NMHBN)=DUM2
      HB2(NMHBN)=DUM3
      ALAG2(NMHBN)=DUM4
      QB1(NMQBN)=DUM5
      QB2(NMQBN)=DUM6
      QBANG(NMQBN)=0.
      WRITE(6,1006) N,XORD(I),YORD(I),DEPTH(I),NBC(I),HB1(NMHBN),
     1  ALAG1(NMHBN),HB2(NMHBN),ALAG2(NMHBN),QB1(NMQBN),QB2(NMQBN),
     2  DUM7
 1006 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I6,2X,F7.2,2X,
     1  F6.0,2X,F7.2,1X,F6.0,11X,F7.2,2X,F7.2,9X,F4.0)
      GO TO 10
  110 NMQBN=NMQBN+1
      NMVBN=NMVBN+1
      NQN(NMQBN)=I
      NVN(NMVBN)=I
      QB1(NMQBN)=DUM1
```

```
      QB2(NMQBN)=DUM2
      QBANG(NMQBN)=DUM3
      WRITE(6,1008)N,XORD(I),YORD(I),DEPTH(I),NBC(I),QB1(NMQBN),
     1  QB2(NMQBN),DUM3
1008 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I5,36X,
     1  F7.2,2X,F7.2,3X,F4.0)
      QBANG(NMQBN)=QBANG(NMQBN)/180.*3.14159
      GO TO 10
100   NMHBN=NMHBN+1
      NMQBN=NMQBN+1
      NHN(NMHBN)=I
      NQN(NMQBN)=I
      HB1(NMHBN)=DUM1
      ALAG1(NMHBN)=DUM2
      HB2(NMHBN)=DUM3
      ALAG2(NMHBN)=DUM4
      QB1(NMQBN)=DUM5
      QB2(NMQBN)=DUM6
      QBANG(NMQBN)=DUM7
      WRITE(6,1012)N,XORD(I),YORD(I),DEPTH(I),NBC(I),HB1(NMHBN),
     1  ALAG1(NMHBN),HB2(NMHBN),ALAG2(NMHBN),QB1(NMQBN),QB2(NMQBN),
     2  QBANG(NMQBN)
1012 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I4,4X,F7.2,
     1  2X,F6.0,2X,F7.2,1X,F6.0,2X,F7.2,2X,F7.2,1X,F6.0)
      QBANG(NMQBN)=QBANG(NMQBN)*3.14159/180.
      GO TO 10
90    NMHBN=NMHBN+1
      NHN(NMHBN)=I
      HB1(NMHBN)=DUM1
      ALAG1(NMHBN)=DUM2
      HB2(NMHBN)=DUM3
      ALAG2(NMHBN)=DUM4
      WRITE(6,1014)N,XORD(I),YORD(I),DEPTH(I),NBC(I),HB1(NMHBN),
     1  ALAG1(NMHBN),HB2(NMHBN),ALAG2(NMHBN)
1014 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I3,5X,F7.2,
     1  2X,F6.0,2X,F7.2,1X,F6.0)
      GO TO 10
80    NMQBN=NMQBN+1
      NQN(NMQBN)=I
      QB1(NMQBN)=DUM1
      QB2(NMQBN)=DUM2
      QBANG(NMQBN)=DUM3
      WRITE(6,1016)N,XORD(I),YORD(I),DEPTH(I),NBC(I),QB1(NMQBN),
     1  QB2(NMQBN),QBANG(NMQBN)
1016 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I2,39X,
     1  F7.2,2X,F7.2,1X,F6.0)
      QBANG(NMQBN)=QBANG(NMQBN)*3.14159/180.
      GO TO 10
70    WRITE(6,1018) N,XORD(I),YORD(I),DEPTH(I),NBC(I)
1018 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I1)
      GO TO 10
50    IFLUX=IFLUX+1
      NFLUX(IFLUX)=I
      FLUX(IFLUX)=DUM1
      WRITE(6,1020)N,XORD(I),YORD(I),DEPTH(I),NBC(I),FLUX(IFLUX)
1020 FORMAT(1H ,6X,I4,3X,F10.2,2X,F10.2,2X,F7.2,2X,I6,68X,F8.3)
10    CONTINUE
      CALL SLINE(15)
      WRITE(6,1030)NMHBN,NMQBN,NMVBN,IFLUX
1030 FORMAT(1H0,5X,'NUMBER OF PRESCRIBED BOUNDARY AND INTERNAL FLUX NOD
     1ES'/1H0,10X,'PRESCRIBED HEIGHTS, NMHBN =',I5/1H ,10X,
     2  'PRESCRIBED LOCAL X FLUX, NMQBN =',I5/1H ,10X,
     3  'PRESCRIBED X AND Y FLUX, NMVBN =',I5/1H ,10X,
     4  'INTERNAL FLUX NODES, IFLUX =',I5)
      CALL SLINE(36)
      READ(5,1007) (N,(ICON(N,J),J=1,3),CF0(N),CF1(N),EDXX(N),EDYY(N),
     1  EDXY(N), I=1,NMEL)
1007 FORMAT(4I10,F10.0,F6.0,3F6.0)
      WRITE(6,1022)
1022 FORMAT(1H0,5X,'ELEMENT CONNECTIVITIES.'/1H0,10X,'ELEMENT NUMBER',
     1  3X,'NODE 1',3X,'NODE 2',3X,'NODE 3',3X,'BOTT. SHEAR COEF.',
     2  3X,'INTERF. SHEAR COEF.',5X,'EDDY XX',5X,'EDDY YY',5X,
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      3  'EDDY XY'/1H0)
       IF(IFRIC0 .EQ. 1) GO TO 130
       DO 120 I=2,NMEL
       CF0(I)=CF0(1)
 120   CONTINUE
 130   IF(IFRIC1 .EQ. 1) GO TO 135
       DO 132 I=1,NMEL
       CF1(I)=CF1(1)
 132   CONTINUE
 135   IF(IEDVIS .EQ. 1) GO TO 200
       DO 210 I=2,NMEL
       EDXX(I)=EDXX(1)
       EDYY(I)=EDYY(1)
       EDXY(I)=EDXY(1)
 210   CONTINUE
 200   DO 220 I=1,NMEL
       WRITE(6,1024) I,(ICON(I,J),J=1,3),CF0(I),CF1(I),EDXX(I),
      1  EDYY(I),EDXY(I)
 1024 FORMAT(1H ,16X,I3,10X,I3,6X,I3,6X,I3,13X,F10.6,9X,
      1  F10.6,5X,F7.2,5X,F7.2,5X,F7.2)
 220  CONTINUE
      CALL SLINE(36)
      CALL GEOM(NINT,ICON,A,E,AREA,XORD,YORD,SYSMH)
      NBANDQ=2*NEBNCH
      CALL QMAT(SYSMQ,SYSMH)
      CALL ROTMQ(SYSMQ,NQN,QBANC)
      READ(5,1009) ALATT,OMEGA,GRAVT,PERIOD,DENST1,DENST2
 1009 FORMAT(F10.0,E10.3,4F10.0)
      CORIO=2.*OMEGA*SIN(ALATT*3.14159/180.)
      G24=GRAVT/24.
      DRATIO=DENST2/DENST1
      PHASE=TOPI/PERIOD
      WRITE(6,1026)ALATT,CORIO,GRAVT,OMEGA,PERIOD,DENST1,DENST2
 1026 FORMAT(1H0,5X,'SYSTEM PROPERTIES.'/1H0,10X,
     1  'AVERAGE LATITUDE, ALATT = ',F7.2,2X,'(DEGREES N)'/1H ,
     2  10X,'CORIOLIS PARAMETER, CORIO = 2*OMEGA*SIN(ALATT) = ',E10.3,
     3  2X,'(SEC-1)'/1H ,10X,'GRAVITATIONAL ACCELERATION, GRAVT = ',F6.3
     5  , 2X,'(M/SEC2)'/1H ,10X,'ANGULAR VELOCITY OF EARTH ROTATION, OME
     6GA = ',E10.3,2X,'(SEC-1)'/1H ,10X,
     7  'PERIOD OF HARMONIC TIDAL EXCITATION, PERIOD = ',F6.0,2X,
     8  '(SEC)'/1H ,10X,'DENSITY OF LAYER 1, DENST1 = ',F7.2,
     9  ' (KG/M3)'/1H ,10X,'DENSITY OF LAYER 2, DENST2 = ',F7.2,
     A  ' (KG/M3)')
      CALL SLINE(36)
      READ(5,1011)STRTIM,ENDTIM,TINC,NO,BOUND,IDT,NOUT,ITINC,IVELN,IVELP
     1,ITERPC
 1011 FORMAT(3F10.0,I10,F10.0,6I5)
      IF(ITERPC.EQ.0) ITIMT=90000000
      IF(ITERPC.EQ.0) GO TO 1071
      WRITE(6,1094)
 1094 FORMAT(//10X,'INTERPOLATION OPTION---SELECTED LOCATIONS FOR FIELD
     1DATA COMPARISONS OF CURRENTS AND TIDES'/)
      READ(5,1061) NPOINT,ITIMT,ISTP3
 1061 FORMAT(3I10)
      WRITE(6,1066) NPOINT
 1066 FORMAT(/1X,'NUMBER OF POINTS FOR INTERPOLATION OF VELOCITIES AND S
     1URFACE RISE =',I5)
      WRITE(6,1093) ITIMT,ISTP3
 1093 FORMAT(/1X,'INTERPOLATION STARTS AT TIMESTEP NO.',I5,'  AND FROM T
     1HEN ON AT INTERVALS OF ',I5,2X,'TIMESTEPS'/)
      WRITE(6,1067)
 1067 FORMAT(/1X,'INTERPOLATION POINT NO.',7X,'X-COORDINATE',4X,'Y-COORD
     1INATE'/1X,35X,'(M)',13X,'(M)'/)
      DO 1065 I=1,NPOINT
      READ(5,1062) XM(I),YM(I)
 1062 FORMAT(2F10.0)
 1065 WRITE(6,1069) I,XM(I),YM(I)
 1069 FORMAT(I13,19X,F10.2,7X,F10.2)
      CALL SLINE(36)
 1071 CONTINUE
      IF(IVELP.EQ.0) ITIMP=90000000
      IF(IVELP.EQ.0) GO TO 1092
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      READ(5,1061) ITIMP,ISTP1
      WRITE(6,1095) ITIMP,ISTP1
 1095 FORMAT(//1X,'NODAL VELOCITIES WILL BE PUNCHED FOR PLOTTING PURPOSE
     1S STARTING AT TIMESTEP NO.',I5  /1X,'AND FROM THEN ON AT INCREMENT
     2S OF',I5,2X,'TIMESTEPS'/)
      CALL SLINE(36)
 1092 IF(IVELW.EQ.0) ITIMW=900000000
      IF(IVELW.EQ.0) ITIMWE=1
      IF(IVELW.EQ.0) GO TO 1096
      READ(5,1061) ITIMW,ISTP2,ITIMWE
      WRITE(6,1097) ITIMW,ISTP2,ITIMWE
 1097 FORMAT(//1X,'NODAL VELOCITIES AND DEPTHS WILL BE WRITTEN ON THE DI
     1RECT ACCESS FILE STARTING AT TIMESTEP NO.',I5, /1X,'AND FROM THEN
     2ON AT INTERVALS OF',I5,2X,'TIMESTEPS UNTIL TIMESTEP',I5/)
      IPTS=(ITIMWE-ITIMW)*2/ISTP2+2
      NMNP3=3*NMNP
      WRITE(6,1098) IPTS,NMNP3
 1098 FORMAT(/1X,'TOTAL NUMBER OF STORAGE POINTS CREATED ON VELOCITY FIL
     1E =',I5//1X,'FOR EACH CONSECUTIVE PAIR OF STORAGE LOCATIONS, THE O
     2DD NUMBERED LOCATION HAS ONE SET OF NODAL VELOCITIES AND DEPTHS'/
     31X,' (U2,V2, AND DEPTH2) FOR THE TOP LAYER AND THE EVEN NUMBERED L
     4OCATION ONE SET OF THE CORRESPONDING VALUES FOR THE BOTTOM LAYER'/
     5/1X,'WHICH TOTAL TO',I5,2X,'VALUES PER POINT'/)
      DEFINE FILE 10(20 ,20 ,U,IPOINT)
      IPOINT=1
      CALL SLINE(36)
 1096 IF(NMHBN .EQ. 0) GO TO 400
      CALL STORNO(MAXNOD,MAXEWH,MAXHBN,MAXBWH,NBANDH,NMHBN,1,
     1  SYSMH,NHN,SYSBMH,0)
  400 IF(NMVBN .EQ. 0) GO TO 410
      CALL STORNO(MAXMQ,MAXEWQ,MAXQBN,MAXBWQ,NBANDQ,NMVBN,2,SYSMQ,NVN,
     1  SYSBMQ,1)
      LENGTH=MAXQBN*MAXBWQ
      CALL AMATZR(SYSBMQ,LENGTH)
  410 IF(NMQBN .EQ. 0) GO TO 170
      CALL STORNO(MAXMQ,MAXEWQ,MAXQBN,MAXBWQ,NBANDQ,NMQBN,2,SYSMQ,
     1  NQN,SYSBMQ,0)
  170 CALL DECOMP(NMNP,MAXNOD,MAXBWH,NBANDH,SYSMH)
      CALL DECOMP(NMNP2,MAXMQ,MAXBWQ,NBANDQ,SYSMQ)
      TINC2=TINC/2.
      TIME=STRTIM
      WRITE(6,1028) STRTIM,ENDTIM,TINC,NO,BCOND,(TEXT1(IDT,J),J=1,2),
     1  NOUT
 1028 FORMAT(1H0,5X,'INTEGRATION PARAMETERS,'/1H0,10X,
     1  'START TIME OF INTEGRATION, STRTIM = ',F9.1,2X,'SEC'/
     2  1H ,10X,'END TIME OF INTEGRATION, ENDTIM = ',F9.1,2X,'SEC'/
     3  1H ,10X,'CONSTANT TIME INCREMENT, TINC = ',F7.1,2X,'SEC'/1H ,10X
     4  ,'EXTERNAL NODE AT WHICH VARIATION IS BOUNDED BY BCOND, NO = ',
     5  I4/1H ,10X,'CRUDE STABILITY CONTROL,BCOND = ',F6.2/1H ,10X,
     6  'THE TIME INCREMENT IS ASSUMED ',2A4/1H ,10X,
     7  'OUTPUT WILL BE PRINTED FOR EVERY ',I3,' TIMESTEPS')
      NO=NINT(NO)
      CALL SLINE(36)
      READ(5,1015) NMLB,(NMLEN(L), L=1,NMLB)
 1015 FORMAT(8I10)
      DO 350 I=1,NMLB
      JEND=NMLEN(I)
      READ(5,1013)(ICONL(I,J), J=1,JEND)
 1013 FORMAT(20I4)
      WRITE(6,1052) I,NMLEN(I),(ICONL(I,J), J=1,JEND)
 1052 FORMAT(1H0,5X,'LAND SEGMENT ',I2,5X,'# NODES, NMLBN = ',I2 1H ,5X,
     1  'EXTERNAL NODE NUMBERS: ',25(I3,'-')/1H ,20X,25(I3,'-')/
     2 1H ,20X,25(I3,'-')/1H ,20X,25(I3,'-'))
      DO 370 J=1,JEND
      ICONL(I,J)=NINT(ICONL(I,J))
  370 CONTINUE
      WRITE(6,1054) (ICONI(I,J), J=1,JEND)
 1054 FORMAT(1H ,5X,'INTERNAL NODE NUMBERS: ',25(I3,'-')/1H ,
     120X,25(I3,'-')/1H ,20X,25(I3,'-')/1H ,20X,25(I3,'-'))
  350 CONTINUE
      CALL SLINE(36)
      IF(IVERSN .EQ. 1) GO TO 20
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      READ(5,1015) NMOSGM,(NPOIN(I), I=1,NMOSGM)
      WRITE(6,1046) NMOSGM
 1046 FORMAT(1H0,10X,'MODEL VERSION 2 CHOSEN. THE ADDITIONAL',
     1  ' BOUNDARY INFORMATION IS:'/1H0,15X,
     2  'NUMBER OF OCEAN SEGMENTS, NMOSGM = ',I5/1H0)
      IF(NMOSGM .EQ. 0) GO TO 40
      DO 30 I=1,NMOSGM
      J1=NMOBN(I)
      READ(5,1013)(ICONO(I,J), J=1,J1)
      WRITE(6,1048) I,NMOBN(I),(ICONO(I,J), J=1,J1)
 1048 FORMAT(1H ,5X,'SEGMENT ',I3,',  NUMBER OF NODES, NMOBN = ',
     1  I3,',   EXTERNAL NODE NUMBERS: ',15('-',I3)/1H ,20X,
     225(I3,'-')/1H ,20X,25(I3,'-'))
      DO 140 J=1,J1
      ICONO(I,J)=NINT(ICONO(I,J))
  140 CONTINUE
      WRITE(6,1050) (ICONO(I,J), J=1,J1)
 1050 FORMAT(1H ,51X,'INTERNAL NODE NUMBERS: ',15('-',I3)/1H0,20X,
     125(I3,'-')/1H ,20X,25(I3,'-'))
   30 CONTINUE
   40 CALL SLINE(36)
   20 ITIME=0
      READ(5,1017) HINIT
 1017 FORMAT(F10.0)
      WRITE(6,1056)HINIT
 1056 FORMAT(1H0,10X,'INITIAL DEPTH OF LAYER 2 IS, HINIT = ',F8.3,
     1  ' (M)')
      CALL SLINE(40)
      IF(INPUTQ.EQ.1) GO TO 800
      CALL READX(Q1PREV,NMNE2)
      CALL READX(Q2PREV,NMNE2)
  800 IF(INPUTH .EQ. 1) GO TO 230
      CALL READX(H1,NMNP)
      CALL READX(H2,NMNP)
      WRITE(6,1042)
 1042 FORMAT(1H0,'      INITIAL VALUES OF LAYER DEPTHS FOR LAYER 1 AND 2'
     1  ,' ARE:'/1H )
      WRITE(6,1040)(H1(I), I=1,NMNP)
      WRITE(6,1040)(H2(I), I=1,NMNP)
 1040 FORMAT(1H ,10(2X,E10.3))
      CALL SLINE(40)
  230 IF(INPUTH .EQ. 2) GO TO 235
      DO 232 I=1,NMNP
      H2(I)=HINIT
      H1(I)=DEPTH(I)-HINIT
  232 CONTINUE
  235 IF(INPUTQ .EQ. 1) GO TO 270
      DO 190 I=1,NMNP2
      Q1(I)=Q1PREV(I)
      Q2(I)=Q2PREV(I)
  190 CONTINUE
      CALL LOCGLO(QBANG,NQN,Q1PREV,1.)
      CALL LOCGLO(QBANG,NQN,Q2PREV,1.)
      CALL VEL(H1,Q1,U1,V1)
      CALL VEL(H2,Q2,U2,V2)
      WRITE(6,1044)
 1044 FORMAT(1H0,5X,'INITIAL VALUES OF THE FLUXES IN LAYERS 1 AND 2 ',
     1  'ARE:'/1H )
      WRITE(6,1040)  (Q1(I), I=1,NMNP2)
      WRITE(6,1040)  (Q2(I), I=1,NMNP2)
      CALL SLINE(40)
  270 WTIME=-10.
      TIME=TIME+TINC2
      IF(NMHBN .EQ. 0) GO TO 240
      CALL STHB1(H1,HB1,NHN,NMHBN,ALAG1,NMNE,HINIT,DEPTH)
      CALL STHB2(H2,HB2,NHN,NMHBN,ALAG2,NMNE,H1,DEPTH)
  240 CALL INTIMF(H1,H1PREV,NMNE,SYSFQ,NMNP2)
      ITIME=ITIME+1
      TIME=TIME+TINC2
      CALL STQB(Q1,QB1,NQN,NQN)
      CALL  FORCQ1      (H1,H2,Q1,Q2,U1,V1,U2,V2,SOX,SOY,AREA,
     1 A,B,ICON,S1X,S1Y,CFO,CF1,DEPTH,CORX,CORY,SYSFQ,CX,CY,CXY,
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     2 BDXX,EDYY,EDXY)
      CALL SUBCUN(NMQBN,NQN,NBANDQ,SYSPQ,SYSBNC,Q1,Q1PREV,NNNP2,
     1  MAXQBN,MAXBWQ,2)
      IF(IVERSN .EQ. 1)  GO TO 250
      IF(NMOSGM .EQ. 0) GO TO 252
      CALL BOUF1(SYSPQ,H1,H2,XORD,YORD,NMOBN,ICONO,NNNP,NNNP2,
     1  NMOSGM,MAXO,MAXOSM)
252   IF(NMLB .EQ. 0) GO TO 250
      CALL BOUF1(SYSPQ,H1,H2,XORD,YORD,NMLBN,ICONL,NNNP,NNNP2,
     1  NMLB,MAXL,MAXSGM)
250   CALL LOCGLC(QEANG,NQN,SYSPQ,1.)
      CALL SOLVX(Q1,SYSPQ,Q1PREV,SYSBQ,NNNP2,NBANDQ,MAXNQ,MAXBWQ)
      IF(NMQBN .EQ. 0) GO TO 180
      CALL STQB(Q1,QB1,NQN,NVN)
180   DO 150 I=1,NNNP2
      Q1PREV(I)=Q1(I)
150   CONTINUE
      CALL LOCGLC(QEANG,NQN,Q1,-1.)
      CALL VEL(H1,Q1,U1,V1)
      CALL INTIMP(H2,H2PREV,NNNP,SYSPQ,NNNP2)
      CALL STQB(Q2,QB2,NQN,NVN)
      CALL  FORCQ2      (H1,H2,Q1,Q2,TAU2X,TAU2Y,AREA,A,B,
     1 S1X,S1Y,ICON,CF1,DEPTH,CCBX,CCBY,SYSPQ,CX,CY,CXY,
     2 BDXX,EDYY,EDXY,DIRW,GAMW,XW,YW,TT)
      CALL SUBOUN(NMQBN,NQN,NBANDQ,SYSPQ,SYSBPQ,Q2,Q2PREV,NNNP2,
     1  MAXQBN,MAXBWQ,2)
      IF(IVERSN .EQ. 1) GO TO 420
      IF(NMOSGM .EQ. 0) GO TO 422
      CALL BOUF2(SYSPQ,H2,XORD,YORD,NMOBN,ICONO,NNNP,NNNP2,
     1  NMOSGM,MAXO,MAXOSM)
422   IF(NMLB .EQ. 0) GO TO 420
      CALL BOUF2(SYSPQ,H2,XORD,YORD,NMLBN,ICONL,NNNP,NNNP2,
     1  NMLB,MAXL,MAXSGM)
420   CALL LOCGLC(QEANG,NQN,SYSPQ,1.)
      CALL SOLVX(Q2,SYSPQ,Q2PREV,SYSBQ,NNNP2,NBANDQ,MAXNQ,MAXBWQ)
      IF(NMQBN .EQ. 0) GO TO 440
      CALL STQB(Q2,QB2,NQN,NVN)
440   DO 450 I=1,NNNP2
      Q2PREV(I)=Q2(I)
450   CONTINUE
      CALL LOCGLC(QEANG,NQN,Q2,-1.)
      CALL VEL(H2,Q2,U2,V2)
      CALL OUTPUT(&330,&300)
260   TIME=TIME+TINC2
      CALL ABATZF(SYSPH,NNNP)
      CALL FORCEH(Q1,SYSPH,A,B,ICON)
      IF(NMHBN .EQ. 0) GO TO 160
      CALL STHB1(H1,HB1,NHN,NMHBN,ALAG1,NNNP,HINIT,DEPTH)
      CALL SUBCUN(NMHBN,NHN,NBANDH,SYSPH,SYSBPH,H1,H1PREV,NNNP,
     1  MAXHBN,MAXBWH,1)
160   CALL SOLVX(H1,SYSPH,H1PREV,SYSBH,NNNP,NBANDH,MAXNOD,MAXBWH)
      IF(NMHBN .EQ. 0) GO TO 161
      CALL STHB1(H1,HB1,NHN,NMHBN,ALAG1,NNNP,HINIT,DEPTH)
161   CALL ABATZR(SYSPH,NNNP)
      CALL FORCEH(Q2,SYSPH,A,B,ICON)
      IF(NMHBN .EQ. 0) GO TO 430
      CALL STHB2(H2,HB2,NHN,NMHBN,ALAG2,NNNP,E1,DEPTH)
      CALL SUBCUN(NMHBN,NHN,NBANDH,SYSPH,SYSBPH,H2,H2PREV,NNNP,
     1  MAXHBN,MAXBWH,1)
430   CALL SOLVX(H2,SYSPH,H2PREV,SYSBH,NNNP,NBANDH,MAXNOD,MAXBWH)
      IF(NMHBN .EQ. 0) GO TO 240
      CALL STHB2(H2,HB2,NHN,NMHBN,ALAG2,NNNP,E1,DEPTH)
      IF(ITIME.EQ.ITIMC) CALL CARDO(H1,Q1,NNNP,NNNP2,2)
      IF(ITIME.EQ.ITIMC) CALL CARDO(H2,Q2,NNNP,NNNP2,2)
      GO TO 240
300   CALL CETA(H1,H2,HINIT,ETA1,ETA2,DEPTH,NNNP)
      CALL VOLUME(ETA1,AREA,ICON,VOL1)
      CALL VOLUME(ETA2,AREA,ICON,VOL2)
      WRITE(6,1034) TIME,TINC,ITIME,VOL1,VOL2,IECINT
1034  FORMAT(1H0,10X,'TIME = ',E12.2,' SEC',5X,'DELTA T WAS, TINC = ',
     1  F8.2,1X,'SEC.',5X,'TIME STEP, ITIME = ',I5/1H0,10X,
     2  'NET EXCESS VOLUME FOR LAYER 1, VOL1 =',E14.6/1H ,10X,
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     3  'NET VOLUME ABOVE NLB, VOL2 = ',E13.6,'      IPOINT=',I8)
      CALL SLINE(25)
      WRITE(6,1080)
1080  FORMAT('  NINT NEXT  DEPTH-1   XFLUX-1     YFLUX-1   ELEV-1   XVEL
     1-1   YVEL-1       DEPTH-2      XFLUX-2   YFLUX-2   ELEV-2   XVEL-2
     2 YVEL-2')
      DO 310 I=1,NMNP
      WRITE(6,1032)I,NEXT(I),H1(I),Q1(2*I-1),Q1(2*I),ETA1(I),U1(I),
     1  V1(I),H2(I),Q2(2*I-1),Q2(2*I),ETA2(I),U2(I),V2(I)
1032  FORMAT(1H ,2I4,3F11.5,F10.5,2F9.5,' $ ',F10.5,2F11.5,3F9.5)
310   CONTINUE
330   H1REF=DEPTH(NO)-HINIT
      TDEPTH=H1(NO)+H2(NO)
      CALL CHECKS(H1(NO),H1REF,ECOND,&320)
      CALL CHECKS(TDEPTH,DEPTH(NO),ECOND,&320)
      IF(ITIME.EQ.ITIMC) CALL CANDO(H1,Q1,NMNE,NMNP2,1)
      IF(ITIME.EQ.ITIMC) CALL CANDO(H2,Q2,NMNE,NMNP2,1)
      IF (ITIME.LT.ITIMP) GO TO 231
      I3=ITIME-ITIMP
      IF (I3/ISTP1*ISTP1.EQ.I3) WRITE(7,8504) ITIME
8504  FORMAT(I10)
      IF (I3/ISTP1*ISTP1.EQ.I3) WRITE(7,999)  (U2(II),V2(II), II=1,NMNP)
      IF (I3/ISTP1*ISTP1.EQ.I3) WRITE(7,999)  (U1(II),V1(II), II=1,NMNP)
999   FORMAT(8F10.3)
231   IF(ITIME.GT.ITIMNE) GO TO 233
      IF(ITIME.LT.ITIMN) GO TO 233
      I9=ITIME-ITIMN
      IF(I9/ISTP2*ISTP2.EQ.I9) WRITE(10'IPOINT)   (U2(II),V2(II),H2(II),
     1 II=1,NMNP)
      IF(I9/ISTP2*ISTP2.EQ.I9) WRITE(10'IPOINT)   (U1(II),V1(II),H1(II),
     1 II=1,NMNP)
233   IF(ITIME.LT.ITIMT) GO TO 234
      I8=ITIME-ITIMT
      IF(I8/ISTP3*ISTP3.NE.I8) GO TO 234
      CALL SLINE(36)
      WRITE(6,1033) TIME,ITIME
1033  FORMAT(1H ,10X,'TIME= ',F12.2,'SEC',5X,'ITIME= ',I5)
      WRITE(6,1035)
1035  FORMAT(1X,' INTERPOLATION PT DEPTH-1  ELEV-1  XVEL-1  YVEL-1  DEPT
     1H-2  ELEV-2  XVEL-2  YVEL-2')
      DO 1070 I=1,NPOINT
      L=I
      CALL INTEPO(V1,U2,XM,YM,L,V1M,U2M,ICON,NEXT,NINT,XORD,YORD)
      CALL INTEPO(U1,V2,XM,YM,L,U1M,V2M,ICON,NEXT,NINT,XORD,YORD)
      CALL INTEPO(H1,H2,XM,YM,L,H1M,H2M,ICON,NEXT,NINT,XORD,YORD)
      CALL INTEPO(ETA1,ETA2,XM,YM,L,ETA1M,ETA2M,ICON,NEXT,NINT,XORD,
     1 YORD)
      WRITE(6,1060) L,H1M,ETA1M,U1M,V1M,H2M,ETA2M,U2M,V2M
1060  FORMAT(1X,I6,8X,8F8.2)
1070  CONTINUE
      CALL SLINE(36)
234   IF(TIME.GT.ENDTIM+0.001) GO TO 320
      GO TO 260
      END


      SUBROUTINE AMATZR(AMAT,N)
      DIMENSION AMAT(N)
      DO 10 I=1,N
      AMAT(I)=0.
10    CONTINUE
      RETURN
      END
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      SUBROUTINE BAKSUB(NE,INDX1,INDX2,NBAND,B,X)
      DIMENSION B(INDX1,INDX2), X(INDX1)
      X(NE)=X(NE)/B(NE,1)
      NDIF=NBAND-1
      DO 10 N=1,NDIF
      J=NE-N
      J1=J+1
      A=0.
      DO 20 K=J1,NE
      KJB=K-J+1
      A=A+B(J,KJB)*X(K)
   20 CONTINUE
      X(J)=(X(J)-A)/B(J,1)
   10 CONTINUE
      NE1=NE-1
      DO 30 N=NBAND,NE1
      J=NE-N
      J1=J+1
      A=0.
      KT=J+NDIF
      DO 40 K=J1,KT
      KJB=K-J+1
      A=A+B(J,KJB)*X(K)
   40 CONTINUE
      X(J)=(X(J)-A)/B(J,1)
   30 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE BOUF1(SYSFQ,H1,H2,XORD,YORD,NMBN,ICONB,NMNP,NMNP2,
     1  NMB,MAXBN,MAXSGM)
      COMMON/CFRCE/GRAVT,CORIO,DENST1,DENST2,G24,DRATIO
      DIMENSION SYSFQ(NMNP2),H1(NMNP),H2(NMNP),XORD(NMNP),YORD(NMNP),
     1  NMBN(NMB),ICONB(MAXSGM,MAXBN)
      DO 10 I=1,NMB
      JEND=NMBN(I)
      DO 20 J=2,JEND
      K1=ICONB(I,J-1)
      K2=ICONB(I,J)
      ANX=YORD(K2)-YORD(K1)
      ANY=XORD(K1)-XORD(K2)
      H1H1=(H1(K1)+H1(K2))**2
      H1H2=(H1(K1)+H1(K2))*(H2(K1)+H2(K2))
      SYSFQ(2*K1-1)=SYSFQ(2*K1-1)-DRATIO*GRAVT/12.*ANX*(H1H2
     1  +2.*H1(K1)*H2(K1))-G24*ANX*(H1H1+2.*H1(K1)**2)
      SYSFQ(2*K2-1)=SYSFQ(2*K2-1)-DRATIO*GRAVT/12.*ANX*(H1H2
     1  +2.*H1(K2)*H2(K2))-G24*ANX*(H1H1+2.*H1(K2)**2)
      SYSFQ(2*K1)=SYSFQ(2*K1)-DRATIO*GRAVT/12.*ANY*(H1H2
     1  +2.*H1(K1)*H2(K1))-G24*ANY*(H1H1+2.*H1(K1)**2)
      SYSFQ(2*K2)=SYSFQ(2*K2)-DRATIO*GRAVT/12.*ANY*(H1H2
     1  +2.*H1(K2)*H2(K2))-G24*ANY*(H1H1+2.*H1(K2)**2)
   20 CONTINUE
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE BOUF2(SYSFQ,H2,XORD,YORD,NMBN,ICONB,NMNP,NMNP2,
     1  NMB,MAXBN,MAXSGM)
      COMMON/CFRCE/GRAVT,CORIO,DENST1,DENST2,G24,DRATIO
      DIMENSION SYSFQ(NMNP2),H2(NMNP),XORD(NMNP),YORD(NMNP),NMBN(NMB),
     1  ICONB(MAXSGM,MAXBN)
      DO 10 I=1,NMB
      JEND=NMBN(NMB)
      DO 20 J=2,JEND
      K1=ICONB(I,J-1)
      K2=ICONB(I,J)
      ANX=YORD(K2)-YORD(K1)
      ANY=XORD(K1)-XORD(K2)
      H2H2=(H2(K1)+H2(K2))**2
      SYSFQ(2*K1-1)=SYSFQ(2*K1-1)-G24*ANX*(H2H2+2.*H2(K1)**2)
      SYSFQ(2*K2-1)=SYSFQ(2*K2-1)-G24*ANX*(H2H2+2.*H2(K2)**2)
      SYSFQ(2*K1)=SYSFQ(2*K1)-G24*ANY*(H2H2+2.*H2(K1)**2)
      SYSFQ(2*K2)=SYSFQ(2*K2)-G24*ANY*(H2H2+2.*H2(K2)**2)
   20 CONTINUE
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE CARDO(ETA,C,NMNP,NMNP2,N)
      DIMENSION ETA(NMNP),C(NMNP2)
      IF(N.EQ.1) WRITE(7,100)  (C(I),I=1,NMNP2)
      IF(N.EQ.2) WRITE(7,100)  (ETA(I),I=1,NMNP)
100   FORMAT(8F10.5)
      RETURN
      END


      SUBROUTINE CETA(H1,H2,HINIT,ETA1,ETA2,DEPTH,NMNP)
      DIMENSION H1(NMNP),H2(NMNP),ETA1(NMNP),ETA2(NMNP),DEPTH(NMNP)
      DO 10 I=1,NMNP
      ETA1(I)=H1(I)-DEPTH(I)+HINIT
      ETA2(I)=H1(I)+H2(I)-DEPTH(I)
 10   CONTINUE
      RETURN
      END


      SUBROUTINE CHECKS(H,D,BOUND,*)
      IF(ABS(H-D) .LT. BOUND) RETURN
      WRITE(6,1002) H,D,BOUND
1002 FORMAT(1H0,15X,'STABILITY CHECK: BOUND EXCEEDED AT NODE ',/
     1  1H ,5X,'HEIGHT WAS ',E11.4,5X,'DEPTH ',F6.2,5X,'BOUND = ',F6.2)
      RETURN 1
      END


      SUBROUTINE DECOMP(NEQT,INDX1,INDX2,NBAND,A)
      DIMENSION A(INDX1,INDX2)
      I=1
 70   DIAG=A(I,1)
      IF(DIAG .LT. 1.E-30) GO TO 10
      DIAG =SQRT(DIAG)
      DO 20 K=1,NBAND
      A(I,K)=A(I,K)/DIAG
 20   CONTINUE
      I=I+1
      IF(I .GT. NEQT) RETURN
      LIM=NBAND-1
      I4=I-LIM
      I3=I-1
 50   DO 30 J=1,LIM
      IF(I+J .GT. NEQT+1) GO TO 70
      I2=I4+J-1
      IF(I .LT. NBAND) I2=1
      DO 40 I1=I2,I3
      IF(I-I1+J .GT. NBAND) GO TO 40
      K=I-I1
      A(I,J)= A(I,J)-A(I1,K+1)*A(I1,K+J)
 40   CONTINUE
 30   CONTINUE
      GO TO 70
 10   WRITE(6,1002) I
1002  FORMAT(1H-,5X,'SINGULAR ELEMENT IN ROW',I3)
      STOP
      END


      SUBROUTINE FORCEH(Q,SYSFH,A,B,ICON)
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDQ,MAXNCD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVEN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2  MAXQBM,MAXHBM
      COMMON/SCRTAC/K(3)
      DIMENSION Q(NMNP2),SYSFH(NMNP),ICON(MAXEL,3),A(MAXEL,3),
     1  B(MAXEL,3)
      DO 10 I=1,NMEL
      VAR=0.
      DO 20 J=1,3
      K(J)=ICON(I,J)
      VAR=VAR+B(I,J)*Q(2*K(J)-1)+A(I,J)*Q(2*K(J))
 20   CONTINUE
      VAR=-VAR/6.
      DO 30 J=1,3
      SYSFH(K(J))=VAR+SYSFH(K(J))
 30   CONTINUE
 10   CONTINUE
      RETURN
      END
```

```
      SUBROUTINE FCRCQ1(H1,H2,Q1,Q2,U1,V1,U2,V2,SOX,SOY,AREA,
     1 A,B,ICON,S1X,S1Y,CF0,CF1,DEPTH,CORX,CORY,SYSFQ,CX,CY,CXY,
     2 EDXX,EDYY,EDXY)
      COMMON/CONT/IFRIC0,IFRIC1,IEDVIS,ICNVEC,IWIND,IVERSN
      COMMON/CPMCP/GRAVT,CORIC,DENST1,DENST2,G24,DRATIO
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1 MAXBWQ,NMHEN,NMQEN,NMTEN,MAXHEN,MAXQEN,MAXEL,NMEL,
     2 MAXQBW,MAXTEN
      DIMENSION H1(NMNP),H2(NMNP),Q1(NMNP2),Q2(NMNP2),U1(NMNP),V1(NMNP),
     1 U2(NMNP),V2(NMNP),SOX(NMNP),SOY(NMNP),AREA(NMEL),
     2 A(MAXEL,3),B(MAXEL,3),ICON(MAXEL,3),S1X(NMNP),S1Y(NMNP),
     3 CF0(NMEL),CF1(NMEL),DEPTH(NMNP),CORX(NMNP),CORY(NMNP),K(3),
     4 SYSFQ(NMNP2),CX(NMNP),CY(NMNP),CXY(NMNP),EDXX(NMEL),
     5 EDYY(NMEL),EDXY(NMEL)
      DO 40 I=1,NMNP
      SPEED=SQRT(U1(I)**2+V1(I)**2)
      SOX(I)=U1(I)*SPEED
      SOY(I)=V1(I)*SPEED
      SPEED=SQRT((U1(I)-U2(I))**2+(V1(I)-V2(I))**2)
      S1X(I)=(U2(I)-U1(I))*SPEED
      S1Y(I)=(V2(I)-V1(I))*SPEED
      CORX(I)=CORIC*Q1(2*I)
      CORY(I)=-CORIC*Q1(2*I-1)
   40 CONTINUE
      DO 10 I=1,NMEL
      A12=AREA(I)/12.
      DH1DX=0.
      DH1DY=0.
      H1EMT=0.
      H2EMT=0.
      DDDX=0.
      DDDY=0.
      CORIX=0.
      CORIY=0.
      SOXX=0.
      SOYY=0.
      S1XX=0.
      S1YY=0.
      H1H2=0.
      H1H1=0.
      FXX=0.
      FXY=0.
      FYY=0.
      DO 20 J=1,3
      K(J)=ICON(I,J)
      DH1DX=DH1DX+B(I,J)*H1(K(J))
      DH1DY=DH1DY+A(I,J)*H1(K(J))
      H1EMT=H1EMT+H1(K(J))
      H2EMT=H2EMT+H2(K(J))
      DDDX=DDDX+B(I,J)*DEPTH(K(J))
      DDDY=DDDY+A(I,J)*DEPTH(K(J))
      CORIX=CORIX+CORX(K(J))
      CORIY=CORIY+CORY(K(J))
      SOXX=SOXX-SOX(K(J))
      SOYY=SOYY-SOY(K(J))
      S1XX=S1XX+S1X(K(J))
      S1YY=S1YY+S1Y(K(J))
      H1H2=H1H2+H1(K(J))*H2(K(J))
      H1H1=H1H1+H1(K(J))**2
      FXX=FXX+Q1(2*K(J)-1)*B(I,J)
      FXY=FXY+Q1(2*K(J)-1)*A(I,J)+Q1(2*K(J))*B(I,J)
      FYY=FYY+Q1(2*K(J))*A(I,J)
   20 CONTINUE
      CORIX=CORIX*A12
      CORIY=CORIY*A12
      SOXX=SOXX*A12*CF0(I)
      SOYY=SOYY*A12*CF0(I)
      S1XX=S1XX*A12*CF1(I)
      S1YY=S1YY*A12*CF1(I)
      DO 30 J=1,3
      SYSFQ(2*K(J)-1)=SYSFQ(2*K(J)-1)+G24*DRATIO*DH1DX*(H2EMT+H2(K(J)))
     1 +G24*DDDX*(H1EMT+H1(K(J)))+G24*DRATIO*(H1EMT*H2EMT+H1H2)*B(I,J)
     2 +G24/2.*(H1EMT**2+H1H1)*B(I,J)+CORIX+SOXX+S1XX
     3 +CORX(K(J))*A12-SOX(K(J))*A12*CF0(I)+S1X(K(J))*A12*CF1(I)
     4 -(EDXX(I)*FXX*B(I,J)+EDXY(I)*FXY*A(I,J))/AREA(I)/4.
      SYSFQ(2*K(J))=SYSFQ(2*K(J))+G24*DRATIO*DH1DY*(H2EMT+H2(K(J)))
     1 +G24*DDDY*(H1EMT+H1(K(J)))+G24*DRATIO*(H1EMT*H2EMT+H1H2)*A(I,J)
     2 +G24/2.*(H1EMT**2+H1H1)*A(I,J)+CORIY+SOYY+S1YY
     3 +CORY(K(J))*A12-SOY(K(J))*A12*CF0(I)+S1Y(K(J))*A12*CF1(I)
     4 -(EDXY(I)*FXY*B(I,J)+EDYY(I)*FYY*A(I,J))/AREA(I)/4.
   30 CONTINUE
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE FORCQ2(H1,H2,Q1,Q2,TAU2X,TAU2Y,AREA,A,B,
     1 S1X,S1Y,ICON,CF1,DEPTH,CORX,CORY,SYSFQ,CX,CY,CXY,
     2 EDXX,EDYY,EDXY,DIRW,GAMW,XW,YW,TT)
      COMMON/CGRID/NMNP,NMNE2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1 MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2 MAXQBM,MAXHBM
      COMMON/CFRCE/GRAVT,CCRIO,DENST1,DENST2,G24,DRATIO
      COMMON/COPT/IFRIC0,IFRIC1,IEDVIS,ICMVEC,IWIND,IVERSN
      COMMON/CWIND/WTIME,WMAG,WDIR,MAXWI,STATIM
      DIMENSION H1(NMNP),H2(NMNP),Q1(NMNP2),Q2(NMNP2),CXY(NMNP),
     1 TAU2X(NMNP),TAU2Y(NMNP),ICON(MAXEL,3),CX(NMNP),CY(NMNP),
     2 AREA(NMEL),A(MAXEL,3),B(MAXEL,3),S1X(NMNP),S1Y(NMNP),CF1(NMEL),
     3 DEPTH(NMNP),CORX(NMNP),CORY(NMNP),K(3),SYSFQ(NMNP2),
     4 EDXX(NMEL),EDYY(NMEL),EDXY(NMEL),DIRW(MAXWI),GAMW(MAXWI),
     5 XW(MAXWI),YW(MAXWI),TT(MAXWI)
      CALL WINDS(TAU2X,TAU2Y,DIRW,GAMW,XW,YW,TT)
      DO 40 I=1,NMNP
      CORX(I)=CCRIO*Q2(2*I)
      CORY(I)=-CCRIO*Q2(2*I-1)
   40 CONTINUE
      DO 10 I=1,NMEL
      A12=AREA(I)/12.
      DH1DDX=0.
      DH1DDY=0.
      H2EMT=0.
      H2H2=0.
      CORIX=0.
      CORIY=0.
      S1XX=0.
      S1YY=0.
      S2X=0.
      S2Y=0.
      FXX=0.
      FXY=0.
      FYY=0.
      DO 20 J=1,3
      K(J)=ICOM(I,J)
      DH1DDX=DH1DDX+(H1(K(J))-DEPTH(K(J)))*B(I,J)
      DH1DDY=DH1DDY+(H1(K(J))-DEPTH(K(J)))*A(I,J)
      H2EMT=H2EMT+H2(K(J))
      H2H2=H2H2+H2(K(J))**2
      CORIX=CORIX+CORX(K(J))
      CORIY=CORIY+CORY(K(J))
      S1XX=S1XX-S1X(K(J))
      S1YY=S1YY-S1Y(K(J))
      S2X=S2X+TAU2X(K(J))
      S2Y=S2Y+TAU2Y(K(J))
      FXX=FXX+Q2(2*K(J)-1)*B(I,J)
      FXY=FXY+Q2(2*K(J)-1)*A(I,J)+Q2(2*K(J))*B(I,J)
      FYY=FYY+Q2(2*K(J))*A(I,J)
   20 CONTINUE
      CORIX=CCRIX*A12
      CORIY=CCRIY*A12
      S1XX=S1XX*A12*CF1(I)
      S1YY=S1YY*A12*CF1(I)
      S2X=S2X*A12
      S2Y=S2Y*A12
      DO 30 J=1,3
      SYSFQ(2*K(J)-1)=SYSFQ(2*K(J)-1)-G24*DH1DDX*(H2EMT+H2(K(J)))
     1 +G24/2.*(H2EMT**2+H2H2)*B(I,J)+CCRIX+S1XX+S2X+CORX(K(J))*A12
     2 -S1X(K(J))*A12*CF1(I)+TAU2X(K(J))*A12
     3 -(EDXX(I)*FXX*B(I,J)+EDXY(I)*FXY*A(I,J))/AREA(I)/4.
      SYSFQ(2*K(J))=SYSFQ(2*K(J))-G24*DH1DDY*(H2EMT+H2(K(J)))
     1 +G24/2.*(H2EMT**2+H2H2)*A(I,J)+CCRIY+S1YY+S2Y+CORY(K(J))*A12
     2 -S1Y(K(J))*A12*CF1(I)+TAU2Y(K(J))*A12
     3 -(EDXY(I)*FXY*B(I,J)+EDYY(I)*FYY*A(I,J))/AREA(I)/4.
   30 CONTINUE
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE FORSUB(NE,INDX1,INDX2,NBAND,B,C)
      DIMENSION B(INDX1,INDX2),C(INDX1)
      C(1)=C(1)/B(1,1)
      DO 10 J=2,NBAND
      A=0.
      J1=J-1
      DO 20 L=1,J1
      LJB=J-L+1
      A=A+B(L,LJB)*C(L)
20    CONTINUE
      C(J)=(C(J)-A)/B(J,1)
10    CONTINUE
      NDIF=NBAND-1
      NN=NBAND+1
      DO 30 J=NN,NE
      A=0.
      J1=J-1
      LT=J-NDIF
      DO 40 L=LT,J1
      LJB=J-L+1
      A=A+B(L,LJB)*C(L)
40    CONTINUE
      C(J)=(C(J)-A)/B(J,1)
30    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE GEOM(NINT,ICON,A,B,AREA,XORD,YORD,SYSMH)
      COMMON/CGBIT/NNNP,NNNEL,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1 MAXBWQ,NNFEN,NNQBN,NEVEN,MAXHBN,MAXQBN,MAXEL,NNEL,
     2 MAXCBN,MAXHEM
      COMMON/SORTHC/K(3)
      DIMENSION NINT(NNNP),ICON(MAXEL,3),A(MAXEL,3),B(MAXEL,3),
     1 AREA(NNEL),SYSMH(MAXNOD,MAXBWH),XORD(NNNP),YORD(NNNP)
      DIMENSION IPERM(3,2)
      DATA IPERM/3,1,2,2,3,1/
      WRITE(6,1002)
1002  FORMAT(1H0,5X,'GEOMETRICAL RELATIONS'/1H ,10X,
     2 'ELEMENT'/1H ,10X,'NUMBER',4X,'A1',8X,'B1',
     3 8X,'A2',8X,'B2',8X,'A3',8X,'B3',8X,'AREA'/1H )
      DO 10 I=1,NNEL
      DO 20 J=1,3
      K(J)=NINT(ICON(I,J))
      ICON(I,J)=K(J)
20    CONTINUE
      DO 40 J=1,3
      A(I,J)=XORD(K(IPERM(J,1)))-XORD(K(IPERM(J,2)))
      B(I,J)=YORD(K(IPERM(J,2)))-YORD(K(IPERM(J,1)))
40    CONTINUE
      AREA(I)=0.5*(B(I,1)*A(I,2)-B(I,2)*A(I,1))
      IF(AREA(I) .GT. 0.) GO TO 30
      WRITE(6,1004) I
1004  FORMAT(1H0,5X,'NEGATIVE AREA IN ELEMENT:',I4)
      STOP
30    VAR=AREA(I)/12.
      CALL SORTN
      K1=K(1)
      K2=K(2)
      K3=K(3)
      SYSMH(K1,1)=SYSMH(K1,1)+2.*VAR
      K21=K2-K1+1
      SYSMH(K1,K21)=SYSMH(K1,K21)+VAR
      K31=K3-K1+1
      SYSMH(K1,K31)=SYSMH(K1,K31)+VAR
      SYSMH(K2,1)=SYSMH(K2,1)+2.*VAR
      K32=K3-K2+1
      SYSMH(K2,K32)=SYSMH(K2,K32)+VAR
      SYSMH(K3,1)=SYSMH(K3,1)+2.*VAR
      WRITE(6,1006)I,A(I,1),B(I,1),A(I,2),B(I,2),A(I,3),B(I,3),AREA(I)
1006  FORMAT(1H ,5X,I6,2X,6(F9.1,1X),F12.1)
      IF(K31 .LT. NBANDH) GO TO 10
      NBANDH=K31
10    CONTINUE
      WRITE(6,1010) NBANDH
1010  FORMAT(1H0,10X,'BANDWIDTH OF THIS GRID IS, NBANDH = ',I4)
      CALL SLINE(36)
      IF(NBANDH .LE. MAXBWH) RETURN
      WRITE(6,1008) NBANDH
1008  FORMAT(1H0,5X,'BANDWIDTH IS TOO LARGE, NBANDH = ',I5)
      STOP
      END
```

```
      SUBROUTINE INTEPO(U,V,XM,YM,L,UM,VM,ICON,NEXT,NINT,XORD,YORD)
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2  MAXCBN,MAXHPM
      COMMON/CINTEG/TIME,TINC,RKFACT,RKFAC,ISTEP,PHASE,ITIME
      COMMON/CINTF/MAXPT
      DIMENSION NEXT(MAXNOD),NINT(MAXNOD),XORD(MAXNOD),YORD(MAXNOD),
     1ICON(MAXEL,3),K(3),U(MAXNOD),V(MAXNOD),XM(MAXPT),YM(MAXPT)
      DO 800 I=1,NMEL
      N1=ICON(I,1)
      N2=ICON(I,2)
      N3=ICON(I,3)
      X1=XORD(N1)
      X2=XORD(N2)
      X3=XORD(N3)
      Y1=YORD(N1)
      Y2=YORD(N2)
      Y3=YORD(N3)
      U1=U(N1)
      U2=U(N2)
      U3=U(N3)
      V1=V(N1)
      V2=V(N2)
      V3=V(N3)
      A3=(Y2-Y1)
      B3=-1.*(X2-X1)
      C3=(Y1*X2-X1*Y2)
      DIS3=A3*X3+B3*Y3+C3
      DISM3=A3*XM(L)+B3*YM(L)+C3
      DIM3=ABS(DISM3)
      IF(DIM3.LT.0.001) DISM3=0.
      T3=DIS3*DISM3
      IF(T3.LT.0.) GO TO 810
      A2=(Y3-Y1)
      B2=-1.*(X3-X1)
      C2=(Y1*X3-Y3*X1)
      DIS2=A2*X2+B2*Y2+C2
      DISM2=A2*XM(L)+B2*YM(L)+C2
      DIM2=ABS(DISM2)
      IF(DIM2.LT.0.001) DISM2=0.
      T2=DIS2*DISM2
      IF(T2.LT.0.) GO TO 810
      A1=(Y3-Y2)
      B1=-1.*(X3-X2)
      C1=(Y2*X3-X2*Y3)
      DIS1=A1*X1+B1*Y1+C1
      DISM1=A1*XM(L)+B1*YM(L)+C1
      DIM1=ABS(DISM1)
      IF(DIM1.LT.0.001) DISM1=0.
      T1=DIS1*DISM1
      IF(T1.LT.0.) GO TO 810
      R=(X2-X1)*(Y3-Y1)-(X3-X1)*(Y2-Y1)
      UX=(Y2-Y1)*(U3-U1)-(Y3-Y1)*(U2-U1)
      UY=(X2-X1)*(U3-U1)-(X3-X1)*(U2-U1)
      VX=(Y2-Y1)*(V3-V1)-(Y3-Y1)*(V2-V1)
      VY=(X2-X1)*(V3-V1)-(X3-X1)*(V2-V1)
      UM=U1+(YM(L)-Y1)*UY/R-(XM(L)-X1)*UX/R
      VM=V1+(YM(L)-Y1)*VY/R-(XM(L)-X1)*VX/R
      GO TO 890
  810 IF (I.LT.NMEL ) GO TO 800
      WRITE(6,1080) I
 1080 FORMAT(I10)
      STOP
  800 CONTINUE
  890 RETURN
      END


      SUBROUTINE INTIME(ETA,ETAPRV,NMNP,SYSFQ,NMNP2)
      DIMENSION ETA(NMNP),ETAPRV(NMNP),SYSFQ(NMNP2)
      DO 10 I=1,NMNP
      ETAPRV(I)=ETA(I)
      SYSFQ(I)=0.
   10 CONTINUE
      I1=NMNP+1
      DO 20 I=I1,NMNP2
      SYSFQ(I)=0.
   20 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE LOCGLO(QBANG,NQN,Q,GLTOLO)
      COMMON/ANGLE/S,C
      COMMON/CGRID/NNNP,NNNP2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBNH,
     1  MAXBNQ,NNHBN,NNQBN,NNVEL,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXQBM,MAXHBM
      DIMENSION QBANG(NNQBN),Q(NNNP2),NQN(NNQBN)
      DO 10 I=1,NNQBN
      I1=NQN(I)
      ANG=GLTOLO*QBANG(I)
      CALL TRIGC(ANG)
      CALL ROTV(Q(2*I1-1),Q(2*I1))
10    CONTINUE
      RETURN
      END


      SUBROUTINE OUTPUT(*,*)
      COMMON/CINTEG/TIME,TINC,RKFACT,RKFAC,ISTEP,PHASE,ITIME
      COMMON/COUTP/NOUT
      IF(ITIME/NOUT*NOUT .EQ. ITIME) GO TO 10
      IF(ITIME .EQ. 2) GO TO 10
      IF(ITIME .EQ. 5) GO TO 10
      RETURN 1
10    RETURN 2
      END


      SUBROUTINE POSTTI(A,B,C,D)
      COMMON/ANGLE/SIN,COS
      A1=A*COS+B*SIN
      B=-A*SIN+B*COS
      C1=C*COS+D*SIN
      D=-C*SIN+D*COS
      A=A1
      C=C1
      RETURN
      END


      SUBROUTINE PRET(A,B,C,D)
      COMMON/ANGLE/SIN,COS
      A1=A*COS+C*SIN
      B1=B*COS+D*SIN
      C=-A*SIN+C*COS
      D=-B*SIN+D*COS
      A=A1
      B=B1
      RETURN
      END


      SUBROUTINE QMAT(SYSMQ,SYSMH)
      COMMON/CGRID/NNNP,NNNP2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBNH,
     1  MAXBNQ,NNHBN,NNQBN,NNVEL,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXQBM,MAXHBM
      DIMENSION SYSMQ(MAXNQ,MAXBNQ),SYSMH(MAXNOD,MAXBNH)
      NDIF=NNNP-NBANDH+1
      DO 10 IR=1,NDIF
      DO 20 IC=1,NBANDH
      SYSMQ(2*IR-1,2*IC-1)=SYSMH(IR,IC)
      SYSMQ(2*IR,2*IC-1)=SYSMH(IR,IC)
20    CONTINUE
10    CONTINUE
      N1=NDIF+1
      J1=0
      DO 30 IR=N1,NNNP
      J1=J1+1
      LIM=NBANDH-J1
      DO 40 IC=1,LIM
      SYSMQ(2*IR-1,2*IC-1)=SYSMH(IR,IC)
      SYSMQ(2*IR,2*IC-1)=SYSMH(IR,IC)
40    CONTINUE
30    CONTINUE
      RETURN
      END
```

```
      SUBROUTINE READX(X,NNN)
      DIMENSION X(NNN)
      DO 10 I=1,NNN,8
      READ(5,1001)X(I),X(I+1),X(I+2),X(I+3),X(I+4),X(I+5),X(I+6),X(I+7)
10    CONTINUE
1001  FORMAT(8F10.0)
      RETURN
      END


      SUBROUTINE ROTMQ(SYSMQ,NQN,CBANG)
      COMMON/ANGLE/S,C
      COMMON/CGRID/NNNP,NNNP2,NBANDH,NBANDQ,MAXNOC,MAXMQ,MAXBMH,
     1  MAXBMQ,NNEBN,NNQBN,NEVEN,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXQBN,MAXHEN
      DIMENSION SYSMQ(MAXMC,MAXBMQ),NQN(NNQBN),CBANG(NNQBN)
      LIM1=NBANDQ/2-1
      DO 10 I=1,NNQBN
      IR=NQN(I)
      LIM=LIM1
      IF(IR .LE. LIM) GO TO 20
      CALL TRIGO(CBANG(I))
40    DO 30 IC=1,LIM
      IR1=IR-IC
      CALL POSTTT(SYSMQ(2*IR1-1,2*IC+1),SYSMQ(2*IR1-1,2*IC+2),
     1  SYSMQ(2*IR1,2*IC),SYSMQ(2*IR1,2*IC+1))
30    CONTINUE
      GO TO 10
20    IF(IR .EQ. 1) GO TO 10
      CALL TRIGO(CBANG(I))
      LIM=IR-1
      GO TO 40
10    CONTINUE
      NDIF=(NNNP2-NBANDQ+2)/2
      LIM1=NBANDQ/2
      DO 50 I=1,NNQBN
      IR=NQN(I)
      LIM=LIM1
      IF(IR .GT. NDIF) GO TO 60
      CALL TRIGO(CBANG(I))
80    DO 70 IC=2,LIM
      CALL PRET(SYSMQ(2*IR-1,2*IC-1),SYSMQ(2*IR-1,2*IC),
     1  SYSMQ(2*IR,2*IC-2),SYSMQ(2*IR,2*IC-1))
70    CONTINUE
      GO TO 50
60    IF(IR .EQ. NNNP) GO TO 50
      CALL TRIGO(CBANG(I))
      LIM=LIM-(IR-NDIF)
      GO TO 80
50    CONTINUE
      RETURN
      END


      SUBROUTINE ROTV(A,B)
      COMMON/ANGLE/ S,C
      X=A*C+B*S
      B=-A*S+B*C
      A=X
      RETURN
      END


      SUBROUTINE SLINE(N)
      DATA STAR/3H* */
      WRITE(6,1002) (STAR,I=1,N)
1002  FORMAT(1H0,5X,42A3)
      RETURN
      END
```

```
      SUBROUTINE SOLVX(X,SYSPX,XPREV,SYSMX,NNN,NBAND,INDEX1,INDEX2)
      COMMON/CGBIT/NNNP,NNNE2,NBANDH,NBANDC,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NNHBN,NNQBN,NNVEN,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXQBB,MAXHBB
      COMMON/CINTEG/TIME,TINC,EXFACT,RKFAC,ISTEP,PHASE,ITIME
      DIMENSION X(NNN),SYSPX(NNN),SYSMX(INDEX1,INDEX2),
     1  XPREV(NNN)
      DO 10 I=1,NNN
      X(I)=TINC*SYSPX(I)
   10 CONTINUE
      CALL FORSUB(NNN,INDEX1,INDEX2,NBAND,SYSMX,X)
      CALL BAKSUB(NNN,INDEX1,INDEX2,NBAND,SYSMX,X)
      DO 20 I=1,NNN
      X(I)=X(I)+XPREV(I)
   20 CONTINUE
      RETURN
      END


      SUBROUTINE SORTN
      COMMON/SORTNO/K1,K2,K3
      IF(K1 .LT. K3)  GO TO 10
      K=K3
      K3=K1
      K1=K
   10 IF(K2 .LT. K3)  GO TO 20
      K=K3
      K3=K2
      K2=K
   20 IF(K1 .LT. K2)  RETURN
      K=K2
      K2=K1
      K1=K
      RETURN
      END


      SUBROUTINE STHB1(H1,HE1,NHN,NNHBN,ALAG1,NNNP,HINIT,DEPTH)
      COMMON/CINTEG/TIME,TINC,EXFACT,RKFAC,ISTEP,PHASE,ITIME
      DIMENSION H1(NNNP),NHN(NNHBN),HE1(NNHBN),ALAG1(NNHBN),DEPTH(NNNP)
      DO 10 I=1,NNHBN
      I1=NHN(I)
      H1(I1)=DEPTH(I1)-HINIT+HE1(I)*  (1.-COS(PHASE*(TIME-ALAG1(I))))
   10 CONTINUE
      RETURN
      END


      SUBROUTINE STHB2(H2,HE2,NHN,NNHBN,ALAG2,NNNP,H1,DEPTH)
      COMMON/CINTEG/TIME,TINC,EXFACT,RKFAC,ISTEP,PHASE,ITIME
      DIMENSION H2(NNNP),HE2(NNHBN),NHN(NNHBN),ALAG2(NNHBN),H1(NNNP),
     1  DEPTH(NNNP)
      DO 10 I=1,NNHBN
      I1=NHN(I)
      H2(I1)=DEPTH(I1)-H1(I1)+HE2(I)*(1.-COS(PHASE*(TIME-ALAG2(I))))
   10 CONTINUE
      RETURN
      END


      SUBROUTINE STORBC(INDX1,INDX2,INDX3,INDX4,NBAND,NNBN,NN,A,NB,C,
     1  NV)
      COMMON/CINTEG/TIME,TINC,EXFACT,RKFAC,ISTEP,PHASE,ITIME
      DIMENSION A(INDX1,INDX2),C(INDX3,INDX4),NB(NNBN)
      NDIF=NBAND-1
      DO 10 I=1,NNBN
      IR=NB(I)
      IR1=NN*(IR-1)+1+NV
      IF(IR1 .EQ. 1) GO TO 20
      IF(IR1 .LE. NDIF) NDIF=NN*(IR-1)+NV
      DO 30 IC=1,NDIF
      IR2=IR1-IC
      C(2*I-1,IC)=-A(IR2,IC+1)/TINC
      A(IR2,IC+1)=0.
   30 CONTINUE
      NDIF=NBAND-1
   20 DO 40 IC=1,NDIF
      C(2*I,IC)=-A(IR1,IC+1)/TINC
      A(IR1,IC+1)=0.
   40 CONTINUE
      A(IR1,1)=1.
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE STQB(Q,QB,NQN,NVN)
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDC,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2  MAXQBM,MAXHBM
      COMMON/CINTEG/TIME,TINC,FKFACT,RKFAC,ISTEP,PHASE,ITIME
      DIMENSION Q(NMNP2),QB(NMQBN),NQN(NMQBN),NVN(NMVBN)
      DO 10 I=1,NMQBN
      I1=2*NQN(I)-1
      Q(I1)=QB(I)
   10 CONTINUE
      IF(NMVBN .EQ. 0) GO TO 30
      DO 20 I=1,NMVBN
      I1=2*NVN(I)
      Q(I1)=0.
   20 CONTINUE
   30 RETURN
      END


      SUBROUTINE SUBOUN(NMBN,NN,NBAND,SYSFXB,SYSBMX,X,XPREV,
     1  NEQT,INDX1,INDX2,NV)
      DIMENSION SYSBMX(INDX1,INDX2),NN(NMBN),SYSFXB(NEQT),X(NEQT),
     1  XPREV(NEQT)
      DO 10 I=1,NMBN
      I1=NV*(NN(I)-1)+1
      NDIF=NBAND-1
      IF(I1 .EQ. 1) GO TO 20
      IF(I1 .LT. NBAND) NDIF=I1-1
      DO 30 J=1,NDIF
      SYSFXB(I1-J)=SYSFXB(I1-J)+SYSBMX(2*I-1,J)*(X(I1)-XPREV(I1))
   30 CONTINUE
      NDIF=NBAND-1
   20 IF(I1+NDIF .GT. NEQT) NDIF=NEQT-I1
      DO 40 J=1,NDIF
      SYSFXB(I1+J)=SYSFXB(I1+J)+SYSBMX(2*I,J)*(X(I1)-XPREV(I1))
   40 CONTINUE
   10 CONTINUE
      RETURN
      END


      SUBROUTINE TIMEN
      COMMON/CINTEG/TIME,TINC,FKFACT,RKFAC,ISTEP,PHASE,ITIME
      TIME=TIME+TINC
      RETURN
      END


      SUBROUTINE TRIGO(/A/)
      COMMON/ANGLE/S,C
      S=SIN(A)
      C=COS(A)
      RETURN
      END


      SUBROUTINE VEL(H,Q,U,V)
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDC,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2  MAXQBM,MAXHBM
      DIMENSION H(NMNP),Q(NMNP2),U(NMNP),V(NMNP)
      DO 10 I=1,NMNP
      U(I)=Q(2*I-1)/H(I)
      V(I)=Q(2*I)/H(I)
   10 CONTINUE
      RETURN
      END


      SUBROUTINE VOLUME(ETA,AREA,ICON,VOL)
      COMMON/CGRID/NMNP,NMNP2,NBANDH,NBANDQ,MAXNOD,MAXNQ,MAXBWH,
     1  MAXBWQ,NMHBN,NMQBN,NMVBN,MAXHBN,MAXQBN,MAXEL,NMEL,
     2  MAXQBM,MAXHBM
      DIMENSION ETA(NMNP),AREA(NMEL),ICON(MAXEL,3)
      VOL=0.
      DO 10 I=1,NMEL
      SUM=0.
      DO 20 J=1,3
      SUM=SUM+ETA(ICON(I,J))
   20 CONTINUE
      VOL=AREA(I)*SUM/3.+VOL
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE WINDS (TAUWX,TAUWY,DIRW,GAMW,XW,YW,TT)
      COMMON/CINTEG/TIME,TINC,RKFACT,RKFAC,ISTEP,PHASE,ITIME
      COMMON/COPT/IFRICO,IFRICT,IEDVIS,ICNVEC,IWIND,IVERSN
      COMMON/CGRID/NNNP,NNNE2,NBANDM,NBANDQ,MAXNOD,MAXBQ,MAXBWH,
     1  MAXBWQ,NNFEN,NNQBN,NPVEN,MAXHBN,MAXQBN,MAXEL,NNEL,
     2  MAXCBN,MAXHBM
      COMMON/CWIND/WTIME,WMAG,WDIR,MAXWI,STRTIM
      DIMENSION TAUWX(MAXNOD),TAUWY(MAXNOD),DIRW(MAXWI),GAMW(MAXWI),
     1 XW(MAXWI),YW(MAXWI),TT(MAXWI)
      IF(IWIND.EQ.4) RETURN
      IF(IWIND.EQ.1) GO TO 500
      IF(IWIND.EQ.2) GO TO 120
      DO 270 I=1,NNNP
      TAUWX(I)=0.0
  270 TAUWY(I)=0.0
      IWIND=4
      RETURN
  120 IF(TIME.LT.WTIME) RETURN
      READ(5,100) WTIME,WMAG,WDIR
100   FORMAT(3F10.0)
      IF (WMAG.LT.14.0)AK=.0000011
      IF (WMAG.GE.14.0)AK=.0000011+.0000025*(1.-14.0/WMAG)**2
      TAU=-AK*(WMAG*.51)**2
      TAUX=TAU*SIN(WDIR/57.3)
      TAUY=TAU*COS(WDIR/57.3)
      CALL SLINE(36)
      WRITE(6,1007) TIME,WTIME,WMAG,WDIR,TAUX,TAUY
1007  FORMAT(' WIND VELOCITY FIELD SET FOR TIME OF',F7.0,' SECS. THROUGH'
     1,F7.0,'SECS.'//' WIND MAG.= ',F6.2,' KNOTS   AT A DIRECTION OF ',
     2F6.2,' FROM TRUE NORTH (+Y-AXIS)'//' RESULTING STRESSES ARE TAUX=
     3',F15.9,'   AND TAUY= ',F15.9)
      CALL SLINE(36)
      DO 10 I=1,NNNP
      TAUWX(I)=TAUX
      TAUWY(I)=TAUY
10    CONTINUE
      RETURN
  500 IF((TIME-STRTIM ).GT.TINC) GO TO 300
      READ(5,110) WSTIM,LW,WFREQ
  110 FORMAT(F10.0,I10,F10.0)
      TT(1)=WSTIM
      PI=355./113.
      READ (5,550) (DIRW(L),GAMW(L),L=1,LW)
  550 FORMAT(8F10.2)
      DO 200 L=1,LW
      DIRW(L)=DIRW(L)*PI/180.
      XW(L)=-GAMW(L)*SIN(DIRW(L))
      YW(L)=-GAMW(L)*COS(DIRW(L))
      TT(L+1)=TT(L)+WFREQ
  200 CONTINUE
      LWL=1
  300 L=LWL
      TF=(TIME-TT(L))/WFREQ
      WX=XW(L)+(XW(L+1)-XW(L))*TF
      WY=YW(L)+(YW(L+1)-YW(L))*TF
      WMAG=SQRT(WX**2+WY**2)
      IF(WX.EQ.0.0) GO TO 900
      WDIR=ATAN(WY/WX)
      GO TO 901
  900 IF(WY.GE.0.0) WDIR=PI/2.
      IF(WY.LT.0.0) WDIR=-PI/2.
  901 IF(WX) 335,350,350
  335 IF(WY) 340,345,345
  340 WDIR=WDIR-PI
      GO TO 350
  345 WDIR=WDIR+PI
  350 IF(WMAG.LT.14.0) AK=0.0000011
      IF(WMAG.GE.14.0) AK=0.0000011+0.0000025*(1.-14./WMAG)**2
      TAU= AK*(0.51*WMAG)**2
      TAUX=TAU*COS(WDIR)
      TAUY=TAU*SIN(WDIR)
      TIMEN=TIME+TINC-TT(L)
      AMAG=DIRW(L)*180./PI
      BMAG=DIRW(L+1)*180./PI
      DO 400 I=1,NNNP
      TAUWX(I)=TAUX
      TAUWY(I)=TAUY
  400 CONTINUE
      IF(TIMEN.GT.WFREQ) CALL SLINE(36)
      IF(TIMEN.GT.WFREQ) WRITE(6,1000) GAMW(L+1),BMAG,TIME,TAUWX(1),
     1 TAUWY(1)
      IF(TIMEN.GT.WFREQ) CALL SLINE(36)
      IF((TIME-STRTIM ).LE.TINC) CALL SLINE(36)
      IF((TIME-STRTIM ).LE.TINC) WRITE(6,1000) GAMW(L),AMAG,TIME,
     1 TAUWX(1),TAUWY(1)
      IF((TIME-STRTIM ).LE.TINC) CALL SLINE(36)
 1000 FORMAT(1H ,5X,'WIND MAGNITUDE=',F10.2,2X,'KNOTS',5X,'WIND DIRECTIO
     1N=',F10.2,2X,'DEGREES TRUE',5X,'TIME=',F10.2,2X,'SECONDS'/1X,
     2'RESULTING STRESSES ARE TAUX=',F15.6,'   AND TAUY =',F15.6)
      IF(TIMEN.GT.WFREQ ) LWL=LWL+1
      RETURN
      END
```

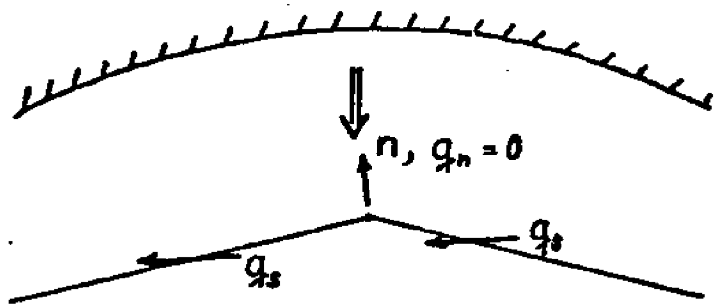
APPENDIX A

Explanation of Outward Normal for Land Boundary Nodes

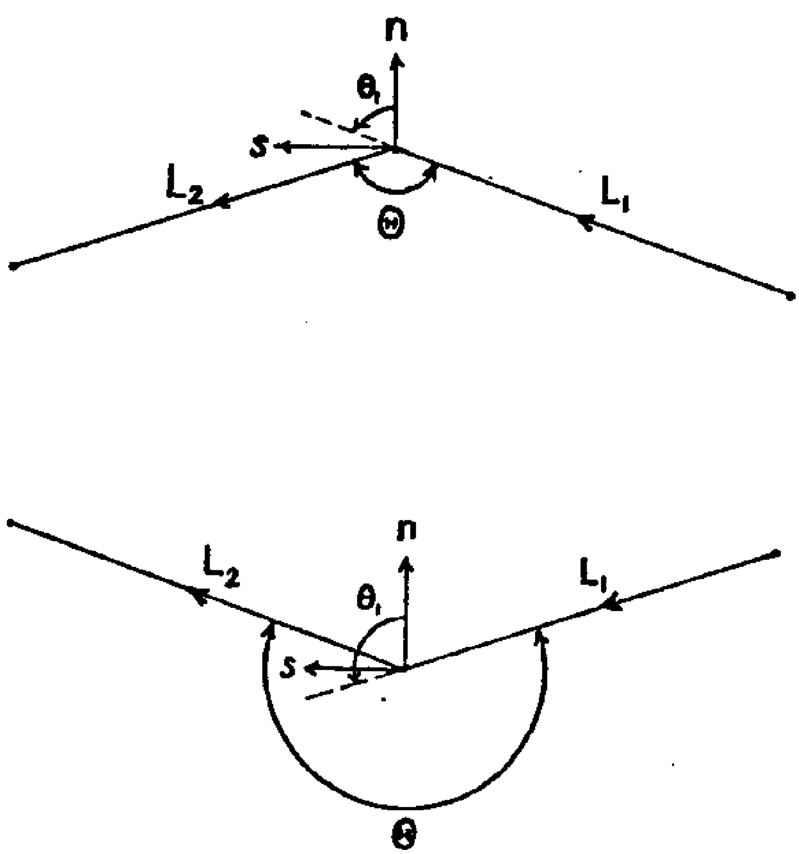
As part of the required input data defined under card group 3 in section 2.0, it is necessary to measure QBANG, the angle between the positive x-axis and the outward normal at each land boundary node. The outward normal is determined by requiring net flow across adjoining segments to vanish. Using the definitions in Figure A-1 which shows both a convex and a concave break, Θ_1 is found by balancing the flow through segment 1 of length L_1 with a flow through segment 2 of length L_2. To obtain a general relationship a positive direction of traverse of the segments is defined such that the flow domain is to the left and the normal to the right or land domain. For a contour enclosing the flow domain this will be a counterclockwise sense. The interior angle is denoted Θ and the angle from n to L is θ_1. Simple geometry yields

$$\cot \theta_1 = \frac{L_2 \sin\Theta}{L_1 - L_2 \cos\Theta} \quad 0 < \theta_1 < \pi; \quad \frac{\pi}{2} < \Theta < 2\pi$$

for $\Theta < \frac{\pi}{2}$ both discharge components should be prescribed to zero since the existence of a tangential flow is physically unreasonable and also can introduce difficulties. For $\Theta < \frac{\pi}{2}$ use NBC = 4 in card group 3.



Curved boundary with FE approximation.



Definition sketches for boundary normals. Convex and concave corners.

Figure A-1

APPENDIX B

Particle-Path Program for "CAFE-2"

This short accessory program to "CAFE-2" calculates the movement of a simulated water "particle" in both layers. The calculation is simply a progressive vectoral addition scheme using the resultant velocities computed in "CAFE-2". The program begins by reading the x and y coordinates of one of more starting locations for a "particle". Utilizing a set of nodal velocities generated by "CAFE-2" on a direct access file for one or more consecutive tidal periods, the program then calculates the movement of the drogue by continually interpolating velocity information in space and by vectorally adding in time to produce the net movement over time. This information is written and punched out in terms of x and y coordinates vs. time. If desired, the punched information may be used with the plotting program presented in APPENDIX C to produce a plot such as shown in Figure B-1. The use of the particle-path program is described below.

Input Data Requirements

Dimension Specifications:

The following cards in the main routine of the program must be adapted for sizes of the dimensioned variables used in the program.

```
DIMENSION NEXT(NUMNP),NINT(NUMNP),XORD(NUMNP),YORD(NUMNP),DEPTH(NUMNP)..DROG0002
DIMENSION ICON(NUMEL,3),K(3),U(NUMNP),V(NUMNP) . . . . . . . . . . . . . . .DROG0003
DIMENSION XM(NSTEP),YM(NSTEP),XXM(NSTEP/3),YYM(NSTEP/3)TITLE(20). . . . DROG0004
```

where NUMNP and NUMEL are defined in card group B-2 and NSTEP is equal to (ENDTIM-STRTIM)/TINC.

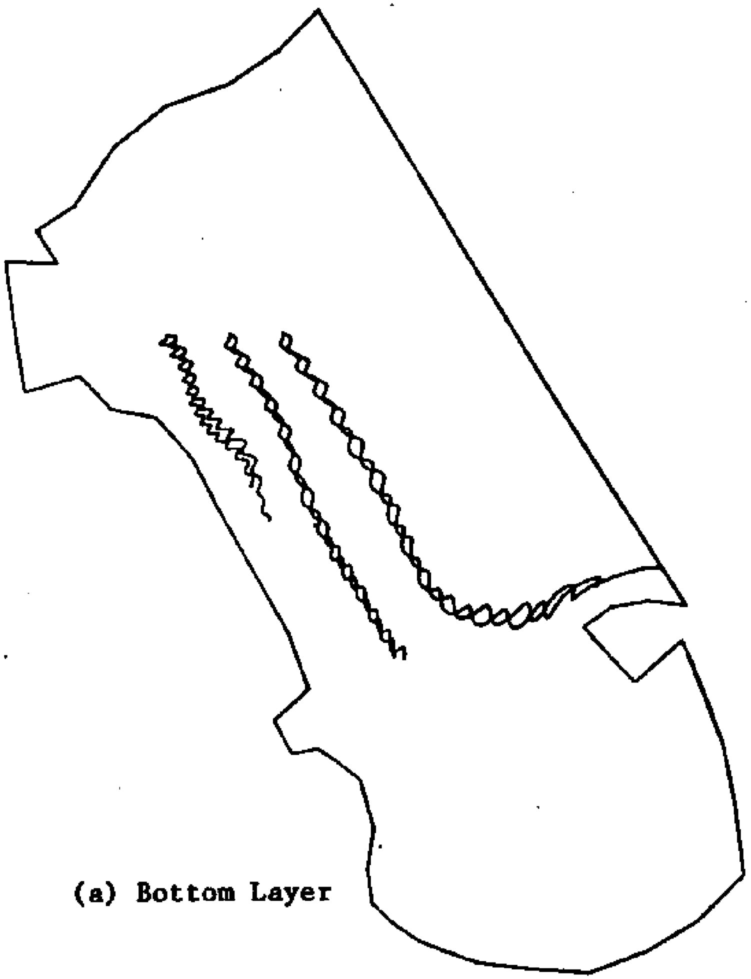
Generalized Input Description

Card group B-1: Title. One card (20A4)

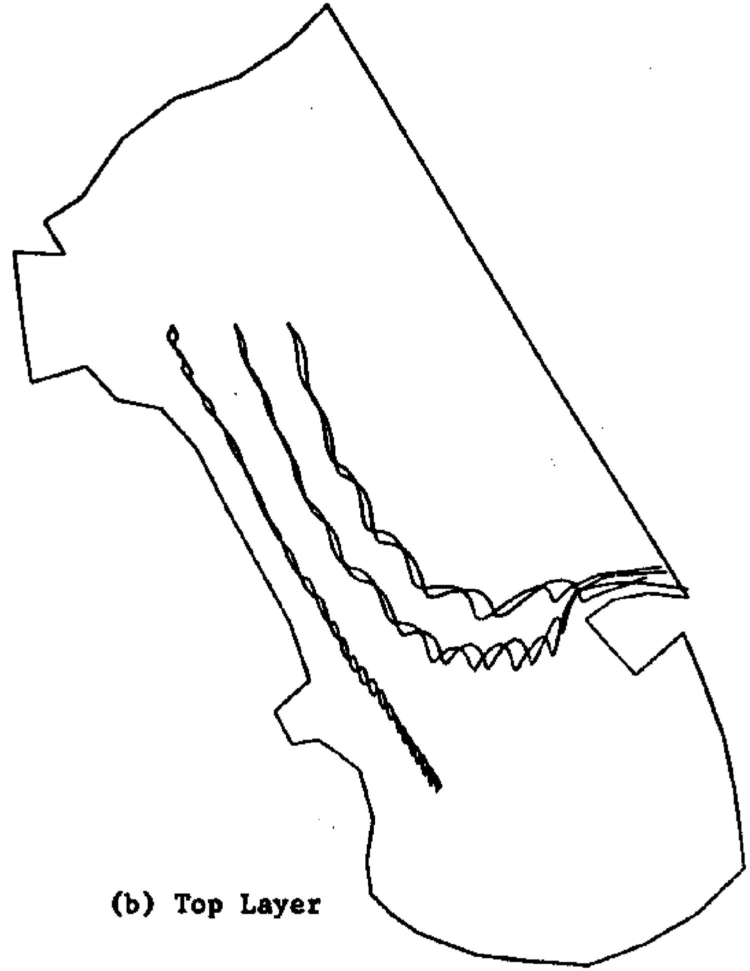
Card group B-2: Parameters. One card (2I10,3F10.0,I10)

NUMNP	number of nodes
NUMEL	number of elements
ENDTIM	the end time, in seconds, of the calculation
STRTIM	the starting time, in seconds, of the calculation
TINC	the time step, in seconds, which is determined by the time step of the velocity file.
IPNCH	= 0 punching for plotting purposes is not desired = 1 punching for plotting purposes is desired

Important! The DEFINE FILE statement must be properly introduced as follows:



(a) Bottom Layer



(b) Top Layer

Figure B-1 Layer-Averaged Seven-Day Particle Paths in Massachusetts Bay

DEFINE FILE A(B,C,U,IPOINT) DROG0009

where A is normally a two digit integer used for JCL purposes,

B is an integer, and is equal to IPTS, the total number of storage locations available on the file. (Each storage location has one set of x and y nodal velocity components and nodal depths for each layer, i.e., for each consecutive pair of storage points, the odd numbered location has U2, V2 and DEPTH2 for the top layer and the even numbered location has U1, V1 and DEPTH1 for the bottom layer)

and C is an integer, and is equal to 3*NUMNP.

Card group B-3: Nodal Information. NUMNP cards (I5, 5X, 2F10.0)

M = 1, NUMNP

NEXT(M)	external node number
XORD(M)	x-coordinate of external node NEXT(M)
YORD(M)	y-coordinate of external node NEXT(M)
	note: same as card group 3 in Section 2.0.

Card group B-4: Element Data. NUMEL cards (4I10)

I = 1, NUMEL

N(I) element number (in ascending order)

ICON(N(I),1)
ICON(N(I),2)
ICON(N(I),3) } external node numbers of the element given in sense of x towards y

note: same as card group 4 in Section 2.0.

Card group B-5: Particle Information. One card for each particle (I10, 2F10.0, I5)

NPOINT	integer assigned to name the particle
XSTART	x-coordinate in meters of the starting position of particle NPOINT
YSTART	y-coordinate in meters of the starting position of particle NPOINT
ISTRT1	the designated starting point for reading the file velocity data (1 < ISTRT1 < IPTS)
ISTRT2	the designated point for rereading the file, i.e., repeating a tidal cycle, if ((ENDTIM-STRTIM)/TINC)*2 of the exercise is larger than (IEND-ISTRT1).
IEND	the designated ending point for reading file data, which may be less than or equal IPTS, but is usually greater than IPTS. (see note)

Note: if the particle is in the top layer, ISTRT1, ISTRT2 and IEND must be odd numbered locations and vice versa for the bottom layer. Example - CAFE-2 is run for a problem where the tidal period is 45 000 seconds and the time step equals 100 seconds. Velocities and depths are stored on file for one tidal cycle every 1500 seconds. The number of storage locations, IPTS, is thus (450-15)/15*2+2 = 60. A particle path is to be caluclated for a particle in the top layer starting at 4500 seconds prototype tidal time and repeated for 10 tidal cycles, i.e., STRTIM=4500, ENDTIM= 454,500. Thus ISTRT1=5, ISTRT2=1, and IEND=61. When the file counter, IPOINT, reaches 61 after reading the last location of information at 59, (60 is skipped), the program automatically sets IPOINT back to 1. For the corresponding particle in the bottom layer, ISTRT1=6, ISTRT2=2, and IEND = 62.

Output Description

1: For each "particle", the headings "POINT NUMBER = , STARTING POINT ON FILE =" "TIME, XORD, YORD" are printed.

2: For each "particle", the x and y coordinates in meters of the moving particle along with the corresponding time in seconds are printed. This occurs every third timestep or 3*TINC seconds until either ENDTIM is reached or the particle hits the outer grid boundary. If the particle hits a grid boundary, the message "PARTICLE GOES OUT OF GRID DOMAIN" is printed and the computation proceeds to the next particle.

Only if IPNCH = 1: Plotting Information

3: For each "particle", two numbers are punched on one card. The first is NPOINT, and the second is the number of sets of x and y coordinates punched for that particle as described above.

4: For each "particle", the x and y coordinates are punched on cards after each header card described above for input into the plotting program described in APPENDIX C.

```
C  SIMULATION OF A DROGUE PATH BY THE TWO-LAYER CIRCULATION MODEL
      DIMENSION NEXT(140),NINT(140),XORD(140),YORD(140),DEPTH(140)
      DIMENSION ICON(224,3),K(3),U(140),V(140)
      DIMENSION XM(1300),YM(1300),XXM(1300),YYM(1300),TITLE(20)
      READ(5,1003) TITLE
 1003 FORMAT(20A4)
      WRITE(6,710) TITLE
  710 FORMAT(1H1//1H ,25X,20A4)
      DEFINE FILE 10 (62,420,U,IPOINT)
      READ(5,720) NUMNP,NUMEL,      ENDTIM,STRTIM,TINC,IPNCH
  720 FORMAT(2I10,3F10.0,I10)
      NSTEP=(ENDTIM-STRTIM)/TINC
      DO 700 M=1,NUMNP
      READ(5,735) NEXT(M),XORD(M),YORD(M)
 735  FORMAT(I5,5X,2F10.0)
      NINT(NEXT(M))=M
 700  CONTINUE
      DO 760 II=1,NUMEL
      READ(5,755) N,(ICON(N,J),J=1,3)
 755  FORMAT(4I10)
      DO 759 J=1,3
      K(J)=NINT(ICON(N,J))
 759  ICON(N,J)=K(J)
 760  CONTINUE
      WRITE(6,730) NUMNP,NUMEL,STRTIM,NSTEP,TINC,ENDTIM
 730  FORMAT (3X,'NUMBER OF NODES=',I5/3X,'NUMBER OF ELEMENTS=',I5/3X,
     1'START TIME=',F10.0,2X,'SECONDS'/3X,'NUMBER OF STEPS=',I5/
     2 3X,'TIME STEP=',F10.0,2X,'SECONDS'/3X,'END TIME=',F10.0,2X,
     3 'SECONDS'/)
 780  READ(5,790) NPOINT,XM(1),YM(1),ISTRT1,ISTRT2,IEND
 790  FORMAT(I10,2F10.0,3I5)
      IF(NPOINT.LT.0) GO TO 999
      TIME=STRTIM
      IPOINT=ISTRT1
      WRITE(6,794) NPOINT,ISTRT1,ISTRT2,IEND
 794  FORMAT(///,3X,'POINT NUMBER=',I5,5X,'STARTING POINT ON FILE=',I5/
     1 3X,'THE DESIGNATED POINT FOR REREADING THE FILE=',I5/
     2 3X,'END POINT ON FILE=',I5/)
      WRITE(6,795)
 795  FORMAT(5X,'TIME',6X,'XORD',6X,'YORD')
      DO 900 L=1,NSTEP
      LS=L
      LL=L-1
      IF((LL/3)*3.NE.LL) GO TO 880
      WRITE(6,870) TIME,XM(L),YM(L)
 870  FORMAT(3F10.0)
 880  READ(10'IPOINT) (U(II),V(II),DEPTH(II),II=1,NUMNP)
      IPOINT=IPOINT+1
      DO 800 I=1,NUMEL
      N1=ICON(I,1)
      N2=ICON(I,2)
      N3=ICON(I,3)
      X1=XORD(N1)
      X2=XORD(N2)
      X3=XORD(N3)
      Y1=YORD(N1)
      Y2=YORD(N2)
      Y3=YORD(N3)
      U1=U(N1)
      U2=U(N2)
      U3=U(N3)
      V1=V(N1)
      V2=V(N2)
      V3=V(N3)
      A3=(Y2-Y1)
      B3=-1.*(X2-X1)
      C3=(Y1*X2-X1*Y2)
      DIS3=A3*X3+B3*Y3+C3
      DISM3=A3*XM(L)+B3*YM(L)+C3
      DIM3=ABS(DISM3)
      IF(DIM3.LT.0.001) DISM3=0.
      T3=DIS3*DISM3
```

```
      IF(T3.LT.0.) GC TO 810
      A2=(Y3-Y1)
      B2=-1.*(X3-X1)
      C2=(Y1*X3-Y3*X1)
      DIS2=A2*X2+B2*Y2+C2
      DISM2=A2*XM(L)+B2*YM(L)+C2
      DIM2=ABS(DISM2)
      IF(DIM2.LT.0.001) DISM2=0.
      T2=DIS2*DISM2
      IF(T2.LT.0.) GC TO 810
      A1=(Y3-Y2)
      B1=-1.*(X3-X2)
      C1=(Y2*X3-X2*Y3)
      DIS1=A1*X1+B1*Y1+C1
      DISM1=A1*XM(L)+B1*YM(L)+C1
      DIM1=ABS(DISM1)
      IF(DIM1.LT.0.001) DISM1=0.
      T1=DIS1*DISM1
      IF(T1.LT.0.) GC TO 810
      R=(X2-X1)*(Y3-Y1)-(X3-X1)*(Y2-Y1)
      UX=(Y2-Y1)*(U3-U1)-(Y3-Y1)*(U2-U1)
      UY=(X2-X1)*(U3-U1)-(X3-X1)*(U2-U1)
      VX=(Y2-Y1)*(V3-V1)-(Y3-Y1)*(V2-V1)
      VY=(X2-X1)*(V3-V1)-(X3-X1)*(V2-V1)
      UM=U1+(YM(L)-Y1)*UY/R-(XM(L)-X1)*UX/R
      VM=V1+(YM(L)-Y1)*VY/R-(XM(L)-X1)*VX/R
      TIME=TIME+TINC
      XM(L+1)=XM(L)+UM*TINC
      YM(L+1)=YM(L)+VM*TINC
      GC TO 890
810   IF (I.LT.NUMEL) GO TO 800
      WRITE (6,820)
820   FORMAT(3X,'PARTICLE GOES OUT OF GRID DOMAIN')
      GO TO 910
800   CONTINUE
890   IF(IPOINT.EQ.IEND) IPOINT=ISTRT2
900   CONTINUR
  910 LP=LS
      DO 920 L=1,LP
      LL=L-1
      IF((LL/3)*3.NE.LL) GO TO 920
      K1=LL/3+1
      XXM(K1)=XM(L)
      YYM(K1)=YM(L)
  920 CONTINUE
      KK=K1
      IF(IPNCH.EQ.0) GO TO 605
      WRITE(7,925) NPOINT,KK
925   FORMAT(2I5)
      WRITE(7,930) (XXM(K1),YYM(K1), K1=1,KK)
 605  CONTINUE
  930 FORMAT(8F10.3)
      GC TO 780
999   STOP
      END
```

APPENDIX C

Cal-Comp Plotting Program for "Particle-Path"

This program plots depth-averaged "particle" paths generated by the particle-path program in Appendix B using velocities from "CAFE-2". Although this plotting program was written using CAL-COMP routines, it should be readily adaptable for use with other plotters in the Fortran-4 system. An example of a typical plot is presented in Figure B-1. The use of the plotting program is described below.

Input Data Requirements

Dimension Specifications:

The following cards in the main routine of the program must be adapted for sizes of the dimensioned variables used in the program.

```
DIMENSION  NEXT(NUMNP),NINT(NUMNP),XORD(NUMNP),YORD(NUMNP) ...PATH0003
DIMENSION  ICON(NUMEL,3),NMBN(NMLB),ICONTU(NMLB,MAXLBN).......PATH0004
DIMENSION  XO(MAXLBN),YO(MAXLBN),XM(MAXSTP),YM(MAXSTP)........PATH0005
```

where NUMEL, NUMNP and MAXLBN are defined in card group C-1, NMLB is defined in card group C-4, and MAXSTP is equal to (ENDTIM-STRTIM)/(TINC*3), where ENDTIM, STRTIM and TINC are defined in card group B-2.

Generalized Input Data Description:

Card group C-1: Parameters. One card (4I10, E15.4)

NUMEL	number of elements
NUMNP	number of nodes
NPTS	number of particle paths to be plotted (in this version, each particle path is plotted on a separate plot)
MAXLBN	number of nodes on the longest land boundary, including first and last
MAXSTP	as defined above
SCALEF	scale conversion factor or coefficient required to reduce grid coordinate scale to desired plot size

Card group C-2: Nodal Information (I5, 5X, 2F10.0)

M = 1, NUMNP

NEXT(M)	external node number
XORD(M)	x-coordinate of external node NEXT(M)
YORD(M)	y-coordinate of external node NEXT(M)

note: same as card group 3 in Section 2.0.

Card group C-3: Element Data. NUMEL cards (4I10)
I = 1, NUMEL
N(I) element number (in ascending order)
ICON(N(I),1)
ICON(N(I),2) } external node numbers of the
ICON(N(I),3) element given in sense of x toward y

note: same as card group 4 in Section 2.0.

Card group C-4: Land Boundary Data. One card (8I10)
NMLB number of land boundaries
(NMBN(I), I = 1, NMLB) number of nodes on each land boundary, including first and last.

note: same as card group 10A in Section 2.0.

Card group C-5: Land Segment Connectivity. NMBN(I)/20 cards per boundary (20I4)
I = 1, NMLB
(ICONTU(J,I),J = 1, NMBN(I)) external node number of boundary I, in sequential order such that the flow domain is to the left of the direction of advance.

note: same as card group 10B in Section 2.0.

Card group C-6: Punched "Particle-Path" coordinates from the Particle Path Program. (One card (2I5) + NSTEP3*2/8 cards (8F10.3)) x number of particles, NPTS.
I = 1, NPTS
NPOINT the integer number assigned to the particle
NSTEP3 from the particle path program, it is (ENDTIM-STRTIM)/(TINC*3), where ENDTIM may be different for each particle if the particle leaves the grid before the end of computation.
(XM(L),YM(L),L=1, NSTEP3) the x and y coordinates in meters which describe the movement of the particle.

Additional Plotting Information:

The user should adjust the following cards according to plotting requirements:

CALL PLOT (X,Y, -3) PATH0044
where X and Y are the coordinates in inches of the origin of the grid such that the outer grid boundaries will fit onto the plotting paper. Note: this is where SCALEF becomes important.

CALL PLOT (A, 0.0, -3) PATH0053
where A is the length in inches required to advance the origin of the grid along the x-axis of the plotter for the next plot.

CALL ENDPLT(B, 0.0, 999) PATH0055

where B is the minimum length in inches for the plotter to clear the last plot and must be greater than the largest positive x-coordinate in inches of the grid.

LISTING OF "PARTICLE-PATH" PLOTTER

```
C     THIS PROGRAM PLOTS DEPTH-AVERAGED "PARTICLE" PATHS
C     GENERATED FROM THE PARTICLE-PATH AND CAFE-2 PROGRAMS
      DIMENSION NEXT(140)   ,NINT(140),XORD(140),YORD(140)
      DIMENSION ICON(224,3),NNBN(1),ICONTU(1,46)
      DIMENSION XC(46),YC(46),XM(500),YM(500)
      READ(5,720) NUMEL,NUMNP,NPTS,MAXLB, MAXSTP,SCALEF
 720  FORMAT(5I10,F15.4)
      COMMON/CPATH/MAXSTP
      COMMON/CPARM/NUMEL,NUMNP,NNLB,SCALEF,MAXLB,NSTEP
      WRITE(6,1011)
 1011 FORMAT(1H ,'THIS PROGRAM PLOTS DEPTH-AVERAGED "PARTICLE" PATHS
     1GENERATED FROM THE PARTICLE-PATH AND CAFE-2 PROGRAMS'//)
      WRITE(6,1010)
 1010 FORMAT(1H ,6X,'NODE',9X,'X-',11X,'Y-'/1H ,5X,'NUMBER',3X,
     1 'COORDINATE',3X,'COORDINATE'/)
      DO 700 M=1,NUMNP
      READ(5,735) NEXT(M),XORD(NEXT(M)),YORD(NEXT(M))
 735  FORMAT(I5,5X,3F10.0)
      WRITE(6,1055) NEXT(M),XORD(NEXT(M)),YORD(NEXT(M))
 1055 FORMAT(1H ,5X,I4,5X,F10.2,3X,F10.2)
      NINT(NEXT(M))=M
 700  CONTINUE
      WRITE(6,1022)
 1022 FORMAT(1H ,5X,'ELEMENT CONNECTIVITIES.'/1H ,10X,'ELEMENT NUMBER',
     1 3X,'NODE 1',3X,'NODE 2',3X,'NODE 3'/1H )
      DO 760 II=1,NUMEL
      READ(5,755) N,(ICON(N,J),J=1,3)
 755  FORMAT(4I10)
      WRITE(6,1024) N,(ICON(N,J),J=1,3)
 1024 FORMAT(2H ,16X,I3,10X,I3,6X,I3,6X,I3)
 760  CONTINUE
      READ(5,1008) NNLB,(NNBN(J),J=1,NNLB)
 1008 FORMAT(8I10)
      DO 30 I=1,NNLB
       NNN=NNBN(I)
      READ(5,1007) (ICONTU(I,III),III=1,NNN)
      WRITE(6,1052) I,NNBN(I),(ICONTU(I,III),III=1,NNN)
 1052 FORMAT(1H ,5X,'LAND SEGMENT ',I2,5X,'# NODES, NNBN = ',I2/1H ,5X,
     1'EXTERNAL NODE NUMBERS: ',25(I3,'-')/1H ,20X,25(I3,'-')/
     2 1H ,20X,25(I3,'-')/1H ,20X,25(I3,'-'))
1007  FORMAT(20I4)
 30   CONTINUE
      CALL PLOTS(IDM,IDM,23)
      CALL PLOT(10.0,1.66,-3)
      DO 100 I=1,NPTS
      CALL PLTCON(NNBN,XORD,YORD,ICONTU,XO,YO)
      READ(5,110) NPCINT,NSTEP
110   FORMAT(2I5)
      READ(5,120) (XM(K1),YM(K1),K1=1,NSTEP)
 120  FORMAT(8F10.3)
      CALL PLPATH(XM,YM)
      IF(I.EQ.NPTS) GO TO 100
      CALL PLOT (8.5,0.0,-3)
 100  CONTINUE
       CALL ENDPLT(16.0,0.0,999)
      STOP
      END


      SUBROUTINE PLTCON(NNBN,XORD,YORD,ICONTU,XO,YO)
      COMMON/CPARM/NUMEL,NUMNP,NNLB,SCALEF,MAXLB,NSTEP
      DIMENSION NNBN(NNLB),XORD(NUMNP),YORD(NUMNP),ICONTU(NNLB,MAXLB),
     1 XO(MAXLB),YO(MAXLB)
      DO 20 J=1,NNLB
      NNN=NNBN(J)
      DO 10 I=1,NNN
      XO(I)= XORD(ICONTU(J,I))*SCALEF
      YO(I)=YORD(ICONTU(J,I))*SCALEF
 10   CONTINUE
      N1=NNBN(J)
      CALL GRAPH(XO,YO,N1,0.,N1)
 20   CONTINUE
      WRITE(6,1002)
 1002 FORMAT(1H0,10X,'CONTOUR PLOT COMPLETED')
      RETURN
      END


      SUBROUTINE PLPATH(XM,YM)
      COMMON/CPARM/NUMEL,NUMNP,NNLB,SCALEF,MAXLB,NSTEP
      COMMON/CPATH/MAXSTP
      DIMENSION XM(MAXSTP),YM(MAXSTP)
      DO 50  L=1,NSTEP
       XM(L)=XM(L)*SCALEF
       YM(L)=YM(L)*SCALEF
50    CONTINUE
      N2=NSTEP
      CALL GRAPH(XM,YM,N2,0.,N2)
      RETURN
      END
```

APPENDIX D

Cal-Comp Plotting Program for "CAFE-2" Velocities

This program plots layer-averaged resultant velocities at element centers for both layers on the same plot. The velocity information is read from punched cards generated by "CAFE-2". Card group 8 in Section 2.0 describes instructions for the punched output. Although this plotting program was written using CAL-COMP routines, it is readily adaptable for use with other plotters in the Fortran-4 system. An example of a typical plot is presented in Figure D-1. Figure D-2 shows a typical grid element plot which is optional with this routine. The use of the plotting program is described below.

Input Data Requirements

Dimension Specifications:

The following cards in the main routine of the program must be adapted for sizes of the dimensioned variables used in the program.

```
DIMENSION ICON(NMEL,3),NINT(NMNP),XORD(NMNP),YORD(NMNP). . . . . . . MAIN0003
DIMENSION NMBN(NMLB),ICONTU(NMLB,MAXLBN). . . . . . . . . . . . . . MAIN0004
DIMENSION NN(NMNP),XO(MAXLBN),YO(MAXLBN),XC(NMEL),YC(NMEL) . . . . . MAIN0005
DIMENSION U(NMNP*2) . . . . . . . . . . . . . . . . . . . . . . . . MAIN0006
```

where NMEL, NMNP and MAXLBN are defined in card group D-1 and NMLB is defined in card group D-4.

Generalized Input Data Description:

Card group D-1: Parameters. One card (5I10, 2E15.4)

NMEL	number of elements
NMNP	number of nodes
NPLOTS	number of plots or sets of velocity components
MAXLBN	number of nodes on the longest land boundary, including first and last
IGRID	= 0 if plotting the element grid system is not desired = 1 if plotting the element grid system is desired
SCALEF	scale conversion factor or coefficient required to reduce grid coordinate scale to desired plot size
CSCALE	when CSCALE = 1.0, the velocity plot scale or ratio is 2.5 cm = 1m/sec. If the typical velocity calculated is much higher (or lower) than 1m/sec, the scale may be altered by changing CSCALE respectively. Figure D-1 shows a plot with CSCALE = 1.0.

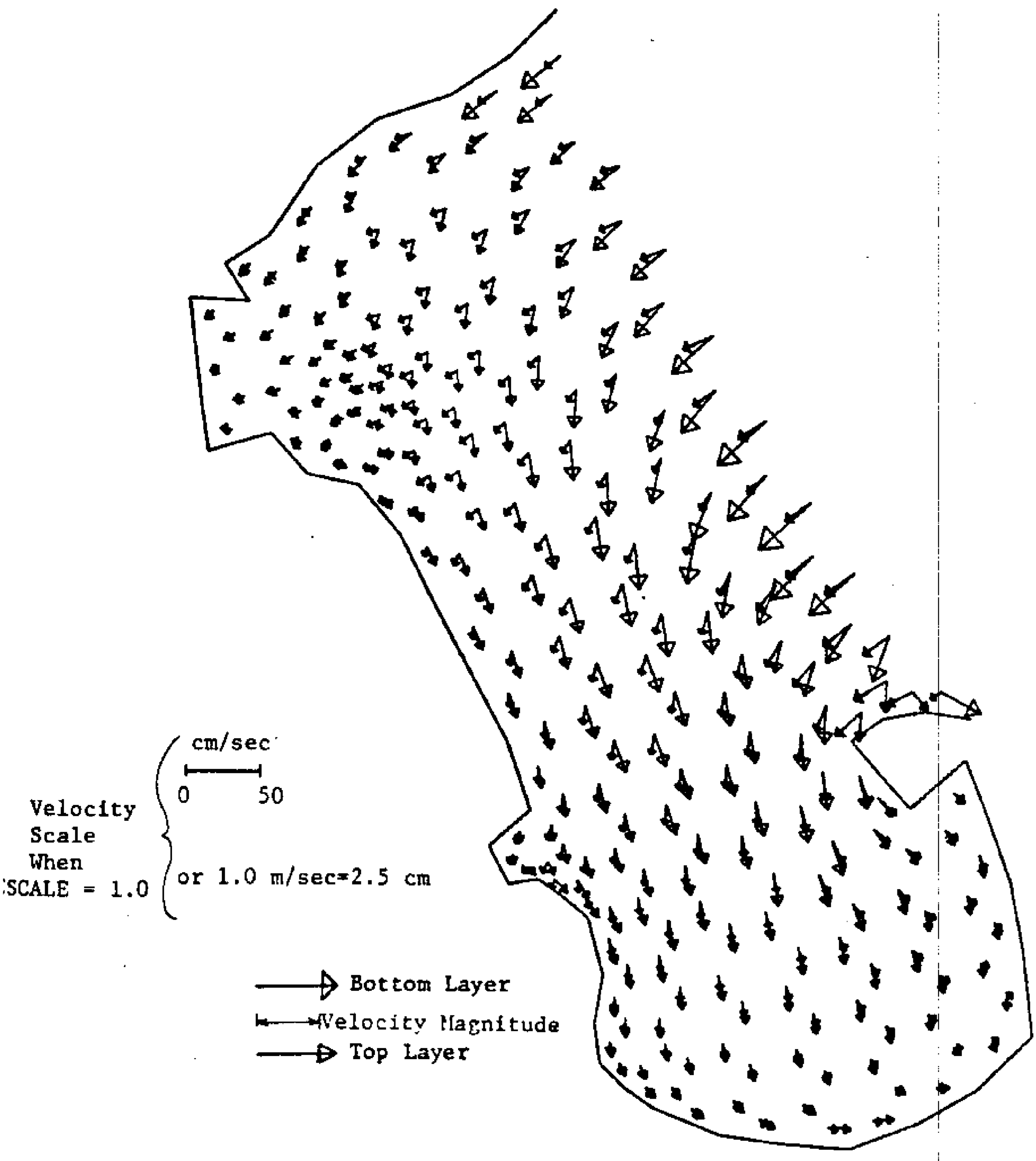

cm/sec
0 50
Velocity
Scale
When
SCALE = 1.0
or 1.0 m/sec=2.5 cm
Bottom Layer
Velocity Magnitude
Top Layer

Figure D-1

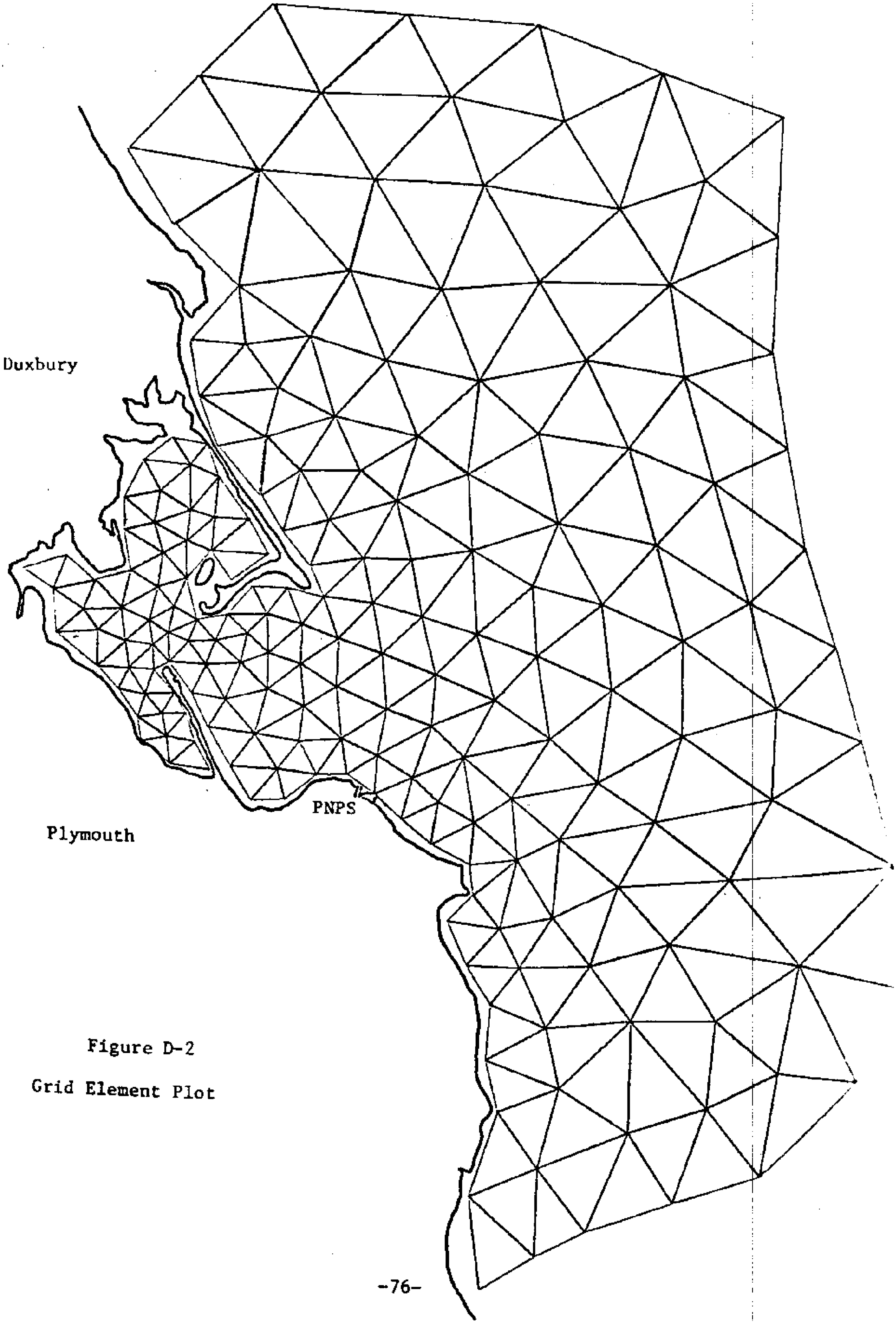


Figure D-2

Grid Element Plot

Card group D-2: Nodal Information. NMNP cards (I5, 5X, 2F10.0)
M = 1, NMNP
NEXT(M) external node number
XORD(M) x-coordinate of external node NEXT(M)
YORD(M) y-coordinate of external node NEXT(M)
note: same as card group 3 in Section 2.0.

Card group D-3: Element Data. NMEL cards (4I10)
I = 1, NMEL
N(I) element number (in ascending order)
ICON(N(I),1), ICON(N(I),2), ICON(N(I),3) — external node numbers of the element given in sense of x towards y

note: same as card group 4 in Section 2.0.

Card group D-4: Land Boundary Data. One card (8I10)
NMLB number of land boundaries
(NMBN(I),I=1,NMLB) number of nodes on each land boundary, including first and last.

note: same as card group 10A in Section 2.0.

Card group D-5: Land Segment Connectivity. NMBN(I)/20 cards per boundary (20I4)
I=1,NMLB
(ICONTU(J,I), J = 1, NMBN(I)) external node numbers of boundary I, in sequential order such that the flow domain is to the left of the direction of advance.

note: same as card group 10B in Section 2.0.

Card group D-6: Punched Velocity Components from "CAFE-2".
(One card (I10) + NMNP*4/8 cards (8F10.2)) x number of plots

I = 1, NPLOTS
ITIMP timestep in "CAFE-2" at which punching occurred for that set of velocity components.
(U2(J),J=1,NMNP*2) upper layer x and y velocity components in internal numbering order for NPLOT I.
(U1(J),J=1,NMNP*2) lower layer x and y velocity components for NPLOT I.

Additional Plotting Information:

The user should adjust the following cards according to plotting requirements:

1.0 In Subroutine STRTPL:

CALL PLOT (X,Y,-3) STRT0010
where X and Y are the coordinates in inches of the origin of the grid such that the outer grid boundaries will fit onto the plotting paper. Note: this is where SCALEF becomes important.

CALL PLOT (A,0.0,-3) STRT0015

where A is the length in inches required to advance the origin of the grid along the x-axis of the plotter for the next plot.

CALL ENDPLT(B,0.0,999) STRT0019

where B is the minimum length in inches for the plotter to clear the last plot and must be greater than the largest positive x-coordinate in inches of the grid.

2.0 In Subroutine VELPLT

The size of the arrowheads is restricted to a minimum and a maximum size, depending on values given in cards VELP0035 and VELP0036. These size restrictions can be adjusted if the typical velocity mangitude requires it. Figure D-1 defines the portion of the arrow which represents velocity magnitude as well as the shape of the arrowhead in both layers.

LISTING OF VELOCITY FIELD PLOTTER

```
C       ACCESSORY PROGRAM TO "CAPE-2"
C       THIS PROGRAM PLOTS DEPTH-AVERAGED RESULTANT
C       VELOCITY VECTORS GENERATED BY "CAPE-2"
        DIMENSION ICON(224,3),NINT(140),XORD(140),YORD(140)
        DIMENSION NMBN(1),ICONTU(1,46)
        DIMENSION NN(140),XO(46),YC(46),XC(224),YC(224)
        DIMENSION U(280)
        COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
        COMMON/CPLOT/NPLOTS,IGRID
        COMMON/CREAD/IEND
        READ(5,1001) NMEL,NMNP,NPLOTS,MAXLB,IGRID,SCALEF,CSCALE
  1001 FORMAT(5I10,2E15.4)
        IEND=2*NMNP
        WRITE(6,1011)
  1011 FORMAT(1H ,'THIS PROGRAM PLOTS DEPTH-AVERAGED RESULTANT VELOCITY
      1VECTORS GENERATED BY "CAPE-2"'//)
        WRITE(6,1010)
  1010 FORMAT(1H ,6X,'NODE',8X,'X-',11X,'Y-'/1H ,5X,'NUMBER',3X,
      1 'COORDINATE',3X,'COORDINATE'/)
        DO 10 I=1,NMNP
        READ(5,1005) NN(I),XORD(NN(I)),YORD(NN(I))
  1005 FORMAT(I5,5X,3F10.0)
        WRITE(6,1055)NN(I),XORD(NN(I)),YORD(NN(I))
  1055 FORMAT(1H ,5X,I4,5X,F10.2,3X,F10.2)
        NINT(NN(I))=I
   10   CONTINUE
        WRITE(6,1022)
  1022 FORMAT(1H ,5X,'ELEMENT CONNECTIVITIES.'/1H ,10X,'ELEMENT NUMBER',
      1 3X,'NODE 1',3X,'NODE 2',3X,'NODE 3'/1H )
        DO 20 K=1,NMEL
        READ(5,1003)  N,(ICON(N,J), J=1,3)
        WRITE(6,1024) N,(ICON(N,J),J=1,3)
  1003 FORMAT(4I10)
  1024 FORMAT(2H ,16X,I3,10X,I3,6X,I3,6X,I3)
 20     CONTINUE
        READ(5,1008) NMLB,(NMBN(J),J=1,NMLB)
  1008 FORMAT(8I10)
        DO 30 I=1,NMLB
         NNN=NMBN(I)
        READ(5,1007) (ICONTU(I,III),III=1,NNN)
        WRITE(6,1052) I,NMBN(I),(ICONTU(I,III),III=1,NNN)
  1052 FORMAT(1H ,5X,'LAND SEGMENT ',I2,5X,'# NODES, NMBN = ',I2/1H ,5X,
      1'EXTERNAL NODE NUMBERS: ',25(I3,'-')/1H ,20X,25(I3,'-')/
      2 1H ,20X,25(I3,'-')/1H ,20X,25(I3,'-'))
 1007  FORMAT(20I4)
  30    CONTINUE
        CALL STRTPL(ICON,NINT,XORD,YORD,U,NMBN,ICONTU,XO,YO,XC,YC)
        STOP
        END

        SUBROUTINE STRTPL(ICON,NINT,XORD,YORD,U,NMBN,ICONTU,XO,YO,XC,YC)
        COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
        COMMON/CPLOT/NPLOTS,IGRID
        COMMON/CREAD/IEND
        DIMENSION ICON(NMEL,3),NINT(NMNP),XORD(NMNP),YORD(NMNP),U(IEND),
      1 NMBN(NMLB),ICONTU(NMLB,MAXLB),XO(MAXLB),YO(MAXLB),XC(NMEL),
      3 YC(NMEL)
        CALL CNTCOR(ICON,XORD,YORD,XC,YC)
        CALL PLOTS(IDM,IDM,23)
        CALL PLOT ( 5.0,2.0 ,-3)
        IF(IGRID.EQ.0) GO TO 50
        CALL ELMPLT(ICON,NINT,XORD,YORD,XO,YO)
   50   CONTINUE
        DO 100 I=1,NPLOTS
        CALL PLOT( 8.5,0.0,-3)
        CALL PLTCON(NMBN,XORD,YORD,ICONTU,XO,YO)
        CALL VELPLT(ICON,NINT,XORD,YORD,U,XC,YC)
  100   CONTINUE
         CALL ENDPLT(10.0,0.0,999)
        RETURN
        END

        SUBROUTINE ELMPLT(ICON,NINT,XORD,YORD,XO,YO)
        COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
        DIMENSION ICON(NMEL,3),NINT(NMNP),XORD(NMNP),YORD(NMNP),
      1 XO(MAXLB),YC(MAXLB)
        DO 10 I=1,NMEL
        DO 20 J=1,3
        XO(J)= XORD(ICON(I,J))*SCALEF
        YO(J)=YORD(ICON(I,J))*SCALEF
   20   CONTINUE
        XC(4)=XO(1)
        YC(4)=YC(1)
        CALL GRAPH(XC(1),YC(1),-1,0.,I)
        CALL GRAPH(XC,YO,4,0.,I)
   10   CONTINUE
        WRITE(6,1002)
  1002 FORMAT(1H0,5X,'ELEMENT PLOT COMPLETED.')
        RETURN
        END
```

```
      SUBROUTINE PLTCON(NMBN,XORD,YORD,ICONTU,XO,YO)
      COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
      DIMENSION NMBN(NMLB),XORD(NMNP),YORD(NMNP),ICONTU(NMLB,MAXLB),
     1 XO(MAXLB),YO(MAXLB)
      DO 20 J=1,NMLB
      NNN=NMBN(J)
      DO 10 I=1,NNN
      XO(I)= XORD(ICONTU(J,I))*SCALEF
      YO(I)=YORD(ICONTU(J,I))*SCALEF
   10 CONTINUE
      N1=NMBN(J)
C
      CALL GRAPH(XO,YO,N1,0.,N1)
   20 CONTINUE
      WRITE(6,1002)
 1002 FORMAT(1H0,10X,'CONTOUR PLOT COMPLETED')
      RETURN
      END


      SUBROUTINE CNTCOR(ICON,XORD,YORD,XC,YC)
      COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
      DIMENSION ICON(NMEL,3),XORD(NMNP),YORD(NMNP),XC(NMEL),YC(NMEL)
      DO 10 I=1,NMEL
      K1=ICON(I,1)
      K2=ICON(I,2)
      K3=ICON(I,3)
      XC(I)=(XORD(K1)+XORD(K2)+XORD(K3))/3.*SCALEF
      YC(I)=(YORD(K1)+YORD(K2)+YORD(K3))/3.*SCALEF
   10 CONTINUE
      RETURN
      END


      SUBROUTINE READU(U)
      COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
      COMMON/CREAD/IEND
      DIMENSION U(IEND)
      READ(5,100) (U(I),I=1,IEND)
  100 FORMAT(8F10.3)
      RETURN
      END


      SUBROUTINE VELPLT(ICON,NINT,XORD,YORD,U,XC,YC)
      COMMON/CPARM/NMEL,NMNP,NMLB,SCALEF,MAXLB,CSCALE
      COMMON/CREAD/IEND
      DIMENSION ICON(NMEL,3),NINT(NMNP),XORD(NMNP),YORD(NMNP),
     1 U(IEND),XC(NMEL),YC(NMEL)
      READ(5,200) ITIME
  200 FORMAT(I10)
      DO 202 NJ=1,2
      CALL READU(U)
      WRITE(6,1101) (U(IJ),IJ=1,IEND)
 1101 FORMAT(10F10.4)
      DO 10 I=1,NMEL
      K1=ICON(I,1)
      K2=ICON(I,2)
      K3=ICON(I,3)
      K1=NINT(K1)*2
      K2=NINT(K2)*2
      K3=NINT(K3)*2
      XX=XC(I)
      YY=YC(I)
      CALL PLOT (XX,YY,3)
      UVEL=(U(K1-1)+U(K2-1)+U(K3-1))/3.
      VVEL=(U(K1)+U(K2)+U(K3))/3.
      IF(ABS(UVEL) .LT. 1.E-20) GO TO 20
      ANG=ATAN(VVEL/UVEL)
      IF(UVEL .LT. 0.) ANG=ANG+3.14159
      ANG=ANG/3.14159*180.-90.
      GO TO 30
   20 IF(VVEL .LT.0.) ANG=-90.
      IF(VVEL .GT. 0.) ANG=90.
   30 X=XC(I)+UVEL/1.016*CSCALE
      Y=YC(I)+VVEL/1.016*CSCALE
      S=SQRT(UVEL**2+VVEL**2)
      SIZE=S/2.
      IF(SIZE .LT. 0.07) SIZE=0.07
      IF(SIZE.GT.0.25) SIZE=0.25
      IF(NJ.EQ.2) GO TO 201
      CALL SYMBOL(X,Y,SIZE, 6,ANG,-2)
      GO TO 10
  201 CALL SYMBOL(X,Y,SIZE, 2,ANG,-2)
   10 CONTINUE
  202 CONTINUE
      WRITE(6,1002)
 1002 FORMAT(1H0,5X,'VELOCITY PLOT COMPLETED')
      RETURN
      END
```

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