file: *tabs-mds.usr* July, 2000

HEC STYLE USER'S GUIDE for TABS-MDS (prior name RMA10-WES)

HEC control card type:
Variable name
Type: integer, floating(s or dp), logical, character
Description
Units - and SI or English
Default value(s) or initialization value(s) - if any

$H CARD	HOTSTART CONTROL	$H CARD

The parameters on this card cause the program to begin with variables computed at the end of a previous model run, thus continuing the computations of the previous run (hotstart).

Field	Variable	Value	Description
0,C1-2	IC1	$H	Card group identifier
1	MHOT	0	One hotstart file written at the last
			time step
		+	Multiple hotstart files written; one hotstart
			written at every MHOT time steps
2	KSALHOT	+	Hotstart salinity concentrations
		0	Do not hotstart salinity concentrations
3	KTEMHOT	+	Hotstart temperature
		0	Do not hotstart temperature
4	KCONHOT	+	Hotstart suspended sediment
		0	Do not hotstart suspended sediment
5	KBEDHOT	+	Hotstart sediment bed
		0	Do not hotstart sediment bed

NOTE: The previous run must have saved output files (see $L2 card) of the desired parameters.

Note: if the $H card is omitted,
MHOT = 0
KSALHOT = 1
KTEMHOT = 1
KCONHOT = 1
KBEDHOT = 1

$L1 CARD	INPUT FILE CONTROL	$L1 CARD

Required

Active parameters on this card cause the program to read data from the requested file.

Field	Variable	Value	Description
0,C1-2	IC1	$L1	Card group identifier
1	INHEC	+	Input RMA-10 run control file (required). File code=2)
2	IFILE	+	Input GFGEN binary geometry (File code=30)
		-	RMA-10 3D geometry from a prior run (File code=30)
		0	Geometry is contained with the file INHEC above
3	NAINPT	+	Input alternate boudary condition file (File code=66)
4	NB	+	Input Hotstart file for initial conditions (File code=62)
		0	Do not read a hotstart
5	NISF	+	Input initial salt ascii geometry look-alike file
		0	Do not read an initial salt file
6	NRDVEL	+	Read in velocities from a TABS-MDS solution file
		0	Do not read in velocities

$L2 CARD	**OUTPUT FILE CONTROL**	**$L2 CARD**

Required

Active parameters on this card cause the program to read data from the requested file.

Field	Variable	Value	Description
0,C1-2	IC1	$L2	Card group identifier
1	NOPT	+	Binary final results (solution) file containing velocities, depth, etc. The content is controlled by the TO-card. (File code=80)
		0	Do not save solution file.
2	IFOT	+	Binary 3D geometry generated by TABS-MDS (File code=40)
		0	Geometry is contained with the file INHEC above
3	NLL	+	Binary HOTSTART output file. Used for saving results at the end of the run with an intent to restart. (File code=63)
		0	Do not save hotstart
4	LOUT	+	Ascii printout of results and convergence parameters. The content is controlled by the TR-card. (File code=20)
		0	Do not save full printout.
5	ISPRT	+	Ascii printout summary of results for selected nodes listed on the TRN-card (File code=64)
		0	Do not save special print.
6	NTDO	+	Binary time derivative results file. Contains time derivatives of velocities, depth, etc. at each time step (file code = 26)
		0	Do not save binary time derivative results file.

$S CARD	**SEDIMENT TRANSPORT FILE CONTROL**	**$S CARD**

Required

Active parameters on this card cause the program to read from or write to the requested file.

Field	Variable	Value	Description
0,C1-2	IC1	$S	Card group identifier
1	NBSI	+	Read bed structure hotstart file (File code = 23)
		0	Do not read bed structure hotstart file
2	NBSO	+	Write bed structure hotstart file (File code = 24)
		0	Do not write bed structure hotstart file
3	NNG	+	Write ascii geometry file. Reflects the bed geometry at the end of the run (File code = 25)
		0	Do not write ascii geometry file.

Note: the bed structure hotstart file will hotstart the bed layer thicknesses and bed sediment concentrations ONLY (i.e. it will not hotstart the delbed , the suspended sediment concentration, or the hydrodynamics). If a standard hotstart file is read in in addition to the bed structure hotstart, the bed layer thicknesses and the bed sediment concentrations given in the bed structure hotstart will overwrite those values given in the standard hotstart.

$M CARD	MACHINE IDENTIFIER	$M CARD

Required

The paramter on this card controls the scratch file (Logical Unit=9) for buffer read/writes.

Field	Variable	Value	Description
0,C1-2	IC1	$M	Card group identifier
1	IVRSID	1	Direct access record length unlimited, and defined in terms of bytes. Example systems are: Definicon 032 board M S FORTRAN for IBM micros
		2	Direct access record length unlimited, and defined in terms of short words (2 bytes). Example systems are: Prime mini-computers
		3	Direct access record length limited to 32 bytes, and defined in terms of long words (4 bytes). Example systems are: DEC Vax
		4	Direct access defined using multiple sequential access file that are opened as required. Note that this may generate and leave many files on disc. Example systems are: APPLE MAC II under ABSOFT FORTRAN, Definicon 020 board, DEC Vax to avoid short record lengths.
		5	Direct access defined for a system using 64 bit or 8 byte words and where record lengths are defined in bytes. Example systems are: Cray Y-MP or Cray C90
		6	Direct access defined using multiple sequential access files that are opened as required. Note that this version does not put a period (.) in the file names. It may generate and leave many files on disc. Example systems are: CDC Cyber
		8	Same as 4 except PAUSE statement is activated

T1-T3 CARD	TITLE DESCRIPTION	T1-T3 CARD

Required

A 'T' card must be the first user input line in the primary TABS-MDS run control file. Any number of T1 and T2 lines may be used and the sequence is not significant. Only one T3 line may be used, and it must be the last title line in the set. The program reads the '3' as meaning the END of the 'T' cards.

Field	Variable	Value	Description
0,C1-2	IC1	T	Card group identifier
0,C2	IC3	1,2,3	
1	TITLE	A	Any alpha-numeric data, up to 77 characters.

CN CARD	CONVERGENCE TEST CRITERION	CN CARD

Active parameters on this card cause the program to alter the default convergence criterion of zero. The values should be in the appropriate units as defined on the SI-card.

Field	Variable	Value	Description
0,C1-2	IC1	CN	Card group identifier
1	NCONV	+	Convergence test switch is activated
		0	Turn convergence test off. Program will use zero for all variables on this card and will iterate until the TIS and TID-card is satisfied
2	CONV(1)	0,+	Maximum allowable change in the X-velocity component
3	CONV(2)	0,+	Maximum allowable change in the Y-velocity component
4	CONV(3)	0,+	Maximum allowable change in the water depth
5	CONV(4)	0,+	Maximum allowable change in the salinity concentration
6	CONV(5)	0,+	Maximum allowable change in the temperature
7	CONV(6)	0,+	Maximum allowable change in the suspended sediment

Note: If the CN card is omitted,
NCONV = 0

CO CARD	COMMENTS	CO CARD

Comments may be supplied on this card anywhere within the run control input except as the first or the last card types.

Field	Variable	Value	Description
0,C1	IC1	CO	Card group identifier
1	FLD	A	Any alpha-numeric data

NOTE: Comments may be incorporated on the same line as the END-card

DE CARD	**WETTING AND DRYING BY ELEMENT ELIMINATION**	**DE CARD**

Active parameters on this card cause the program to check for wetting and drying. The depth criterion must be entered in units appropriate with SI-card.

Field	Variable	Value	Description
0,C1-2	IC1	DE	Card group identifier
1	IDSWT	0	Do not check for wetting and drying.
		+	Iteration frequency of testing for a wet or dry modification Recommendation: IDSWT should be a multiple of the iteration counter (TIS and/or TID card). Set it very large to permit checking only at the end of a time step.
2	DSET	+	Depth below which nodes are considered dry.
		-,0	Defaults to 0.275 ft or 0.084 m
3	DSETD	+	Depth above which nodes become active when re-wetting.
		-,0	Defaults to 0.60 ft or 0.183 m

Note: if the DE card is omitted,
IDSWT = 0

DM CARD	WETTING AND DRYING BY MARSH POROSITY	DM CARD

Active parameters on this card cause the program to use the marsh porosity theory. There are instances when the user may choose to run both wet/dry techniques simultaneously (DE and DM-cards).

Field	Variable	Value	Description
0,C1-2	IC1	DM	Card group identifier
0,C3	IC3	b/	**Option 1**: global assignment
		N	**Option 2**: assignment by node
		E	**Option 3**: assignment by element
		T	**Option 4**: assignment by material type
1	J		**Option 1**
		0	Turns off marsh porosity. All DM cards are ignored.
		-1	Use default values for data fields 2 - 5 for ALL nodes (user specified values are ignored).
		-2	User specifies the values in data fields 2 - 5 for ALL nodes.
		+	User specifies the values in data fields 2 - 5 for all nodes ≥ J.
			Option 2
		+	User specifies the values in data fields 2 - 5 for node J.
			Option 3
		+	User specifies the values in data fields 2 - 5 for element J.
			Option 4
		+	User specifies the values in data fields 2 - 5 for material type J.
2	AC1	+	Bed elevation offset (AO_{abs} = AO - AC1) (default = 3.0 ft or 0.91 m)
		-,0	If AC4 ≠ 0, AO_{abs} = MIN(AC4,AO - ABS(AC1))
3	AC2	+	Transition range of the distribution (default = 2.0 ft or 0.61 m)
4	AC3	+	Minimum wetted surface area factor (default = 0.02)
5	AC4	+,0	Absolute bed elevation (AO_{abs} = AC4). Only active if AC4 ≠ 0 (default = 0)

Note: to activate Marsh Porosity, at least one DMb/ card is required. DMT, DME, or DMN cards may be included as desired.

DF CARD	**TURBULENT DIFFUSION COEFFICIENTS IN THE HORIZONTAL**	**DF CARD**

Required for transport

Field	Variable	Value	Description
0,C1-2	IC1	DF	Card group identifier
C3		b/	Option 1: Global assignment to all material types, starting with IMAT=J
		T	Option 2: Explicit assignment for IMAT J
1	J	+	Starting value or explicit material type (IMAT)
2	ORT(J,8)	+	Turbulent diffusion coefficient associated with the instantaneous direction of flow. The units of this factor are ft^2/sec or m^2/sec, as indicated on the SI-card.
		-	Negative value, results in the magnitude of this entry to be treated as a scale factor applied to a notional element length in the X-direction. Units for the factor is ft/sec or m/sec, as indicated on the SI-card.
3	ORT(J,9)	+	Baseline turbulent diffusion coefficient. It is applied in all directions. The units of this factor are ft^2/sec or m^2/sec, as indicated on the SI-card.
		-	Negative value, results in the magnitude of this entry to be treated as a scale factor applied to a notional element length in the Y-direction. Units for the factor is ft^2/sec or m^2/sec, as indicated on the SI-card.
4	ORT(J,11)	-,0,+	Chezy coefficient for the shoreline. <1 Manning's N coefficient is used. = 0 Do not use.

DZ CARD	**TURBULENT DIFFUSION COEFFICIENTS IN THE VERTICAL**	**DZ CARD**

Required for transport

Field	Variable	Value	Description
0,C1-2	IC1	DZ	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment starting with material type J
		T	Option 2: Explicit assigned by material type J.
1	J	+	Starting value or explicit material type (IMAT)
2	ORT(J,10)	+	Minimum allowable turbulent diffusion coefficient associated with the Z-direction (ft^2/sec). Units for this factor in ft^2/sec or m^2/sec as indicated on the SI-card.

END CARD	END OF TIME STEP SEPERATOR	END CARD

Required

This card signals the end of boundary input for a given time step.

Field	Variable	Value	Description
0,C1-2	IC1	EN	Card group identifier
0,C3	IC3	D	Card group identifier
1-10	ENDCOM	A	May be used for any comments.

EV CARD	HORIZONTAL PARAMETERS FOR TURBULENT EXCHANGE	EV CARD

Required

Field	Variable	Value	Description
0,C1-2	IC1	EV	Card group identifier
0,C3	IC3	b/	Option 1 Global: Starting with IMAT=J
		T	Option 2 Explicit by material type J
1	J	+	Material type (IMAT).
2	ORT(J,1)	+	Turbulent exchange coefficient associated with the instantaneous direction of flow.
3	ORT(J,2)	+	Baseline turbulent exchange coefficient. It is applied in all directions.
4	ORT(J,3)	+	Not used. Fill with any real number.
5	ORT(J,4)	+	Not used. Fill with any real number.
6	ORT(J,5)	+	Roughness-Chezy coefficient or Manning's N. Apply Manning’s if<1.0

Note: Units for turbulent exchange coefficients are lb-sec/ft^2 or Pascal-sec for SI units.

EZ CARD	**VERTICAL PARAMETERS FOR TURBULENT EXCHANGE**	**EZ CARD**

Required for 3-D calculations

Field	Variable	Value	Description
0,C1-2	IC1	EZ	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment, starting with IMAT=J
		T	Option 2: Explicit assignment by material type.
1	J	+	Material number for assignment
2	ORT(J,6)	+	Minimum allowable turbulent exchange coefficient associated with the Z direction in the X plane (lb-sec/ft^2) or (Pascal-sec).
3	ORT(J,7)	+	Minimum allowable turbulent exchange coefficient associated with the Z direction in the Y plane (lb-sec/ft^2) or (Pascal-sec).

FD CARD	FLUID DENSITY COUPLING BY CONSTITUENT-SALINITY, TEMPERATURE AND SUSPENDED SEDIMENT	FD CARD

Field	Variable	Value	Description
0,C1-2	IC1	FD	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment starting at NODE
		N	Option 2: Assignment by individual node. *(not available yet)*
1	NODE	+	Node number for assignment
2	IPASS1	1	Treat the salinity as a passive constitient,ie, no density coupling.
		0	Treat the salinity as density coupled to the other active constituents.
3	IPASS2	1	Treat the temperature as a passsive constituent, ie, no density coupling.
		0	Treat the temperature as density coupled to the other active constituents.
4	IPASS3	1	Treat the suspended sediment as a passsive constituent, ie, no density coupling.
		0	Treat the suspended sediment as density coupled to the other active constituents.

Note: if FD card is omitted,
IPASS1 = 1
IPASS2 = 1
IPASS3 = 1

G1 CARD	GEOMETRY, NODAL SCALE FACTORS	G1 CARD

Field	Variable	Value	Description
0,C1-2	IC1	G1	Card group identifier
1	XSCALE	+	Scale factor for X coordinate input.
2	ZSCALE	+	Scale factor for Y coordinate input.

Note: If G1 card is omitted,
XSCALE = 1.0
ZSCALE = 1.0

GO CARD	**INTERNAL NODE REORDERING FOR THE SYSTEM EQUATIONS**	**GO CARD**

Field	Variable	Value	Description
0,C1-2	IC1	GO	Card group identifier
1	IRO	+,0	Control for internal node reordering of the system equations. = 0 No node reordering input. = 1 Expect reordering input
2	IE	+	Element number
3	NFIXH(IE)	+	Complete list of element numbers which can be used to reorder the internal formulation of the system equations. This feature can be used to achieve more efficient core storage allocation without re-entering other existing system data.

NOTE: Typically GFGEN reordering is all that is necessary.

GC CARD	GEOMETRY, CONTINUITY CHECK LINES	GC CARD

Required

DIFFERENT THAN other TABS CONTINUITY

The GC-card dimensions are controlled by program PARAMETER variables MCC and MCCN. Flow continuity can be calculated at up to MCC lines across part or all of the grid with up to MCCN corner nodes per line. Prescribe the boundary line first since that line is used in calculating the percents displayed on all subsequent lines. Code corner nodes only. Code all lines in the same direction; otherwise sign changes will occur in the printout. In general, code left to right when facing downstream. The first list should be the inflow boundary because is assumed to be 100%.

Field	Variable	Value	Description
0,C1-2	IC1	GC	Card group identifier
1	J	+	Continuity line number
2	Line(J,K)	+	List of nodes which define the line segments across which the total flow is to be computed for continuity line checking.
N	End of list	-1	Node number of -1 is required to mark the end of a line.

NOTE: If a continuation line is necessary, start the next corner node in field 1 of the next GC card. These lines may also be used for automatic generation of boundary conditions.

GE CARD	**GRID, ELEMENT CONNECTION TABLE**	**GE CARD**

The element connection table will usually be provided by the GFGEN pre-processor and will reside on logical unit IFILE on the $L1-card. If so, this card should be omitted, unless small mesh revisions are required. Otherwise code the Element connection table.

Field	Variable	Value	Description
0,C1-2	IC1	GE	Card group identifier
1	J	+	Element number
2-9	NOP(J,K)	+	Up to 8 node numbers for element J, listed counter-clockwise around the element starting from any corner.
10	IMAT(J)	+	Element material type.
11	TH(J)	+	Direction of eddy viscosity tensor. Optional, may be specified on the GV card. Radians, counter-clockwise from the X-axis. For 1D elements, the direction is automatically aligned with the orientation of the 1D element.

GL CARD	GEOMETRY, INPUT BY LAYER	GL CARD

Required for 3-D calculations

Field	Variable	Value	Description
0,C1-2	IC1	GL	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment by surface nodes, starting with I
		E	Option 2: assignment by corner surface nodes by element number
		N	Option 3: assignment by node number
		T	Option 4: assignment by material type
1	NDP	0	turn off layering
		-1	proportional spacing
		2	absolute elevations
2	I		Node, Element, or Material type as specified by the selected option.
3	NDEP(I)	+	The number of elements in the vertical direction of each corner node. Note that the numbers are only used for corner nodes, all midside nodes may be set to zero
4	THLAY(I,J)	+	The elevation of each non-uniformly spaced corner node below the surface node I.(ie NDP=2) Use zero for uniform spacing (NDP=-1)

GNN CARD	**GEOMETRY, NODAL COORDINATE**	**GNN CARD**

This information is usually provided by the GFGEN pre-processor (see GE CARD). The coordinate values read from the above input are multiplied by the appropriate scale factors, XSCALE and ZSCALE from the G1 card, and should result in the proper X and Y coordinates (units are determined by the SI card) after transformation.

Field	Variable	Value	Description
0,C1-2	IC1	GNN	Card group identifier
0,C3	IC3	N	Card group identifier
1	J	+	Node number
2	CORD(J,1)	+	The X nodal coordinate (ft or m as indicated on the SI card).
3	CORD(J,2)	+	The Y nodal coordinate (ft or m as indicated on the SI card).
4	AO(J)	+	The bottom elevation at node J (ft or m as indicated on the SI card).

GS CARD	GEOMETRY, INPUT SLOPES FOR NODES	GS CARD

Field	Variable	Value	Description
0,C1-2	IC1	GS	Card group identifier
1	INODE	+	Node number
2	ALFAK(I)	+	The angle (radians) at node INODE

NOTE: This card is for 1-D elements only

GW CARD	GEOMETRY, 1-DIMENSIONAL CROSS-SECTION PROPERTIES	GW CARD

Field	Variable	Value	Description
0,C1-2	IC1	GW	Card group identifier
0,C3	IC3	b/	Option 1: Universal asignment for all 1D corner nodes.
		N	Option 2: Assignment by specified 1D node.
1	N	+	Corner 1D node number
2	WIDTH(N)	+	Channel width at specified nodes (feet or meters).
3	SS1(N)	+	Left side slope at specified nodes (inverse bank slope).
4	SS2(N)	+	Right side slope at specified nodes (inverse bank slope).
5	WIDS(N)	+	Width - off channel storage (feet or meters).
6	WSCRIT(N)	+	**Optional** – Critical water surface elevation above which off-channel storage becomes active (feet or meters)
7	SSS(N)	+	**Optional** – inverse bank slope of off channel storage

NOTE: Units depend upon SI card designation.

NOTE: If fields 6 and 7 are omitted, the off-channel storage is assumed to have a rectangular cross-section, with the bottom elevation being equal to the elevation of the node.

NOTE: The inverse bank slope can be defined as follows: If the slope of a line is defined by the ratio of the vertical displacement to the horizontal displacement (i.e. "rise over run"), the inverse bank slope is the value of the horizontal component of the slope if the vertical component is set equal to 1. For example, a slope of 2/5 can be expressed as 1/2.5, where 2.5 is the inverse bank slope.

IC CARD	INITIAL CONDITIONS	IC CARD

Required

Field	Variable	Value	Description
0,C1-2	IC1	IC	Card group identifier
1	ELEV	+	Average initial water surface elevation. Also used for vertical coordinate transformation. (ft or m)
2	UNOM	+,0	Nominal velocity used as an initial guess for coldstart of 1D nodes only. Zero is the default. (ft/sec or m/sec)
3	UDIR	+	Direction (degrees) of the nominal velocity. Counter-clockwise direction from east. (for 1D only)
4	HMNN	+	Minimum depth (ft or m) used at startup.
5	SALT	+	Initial value for the salinity concentration. (ppt)
6	TEMPI	+	Initial value for the temperature. (Degrees C)
7	SEDI	+	Initial value for the suspended sediment concentration.(kg/m3)
8	UINP	+	Read but not used
9	VINP	+	Read but not used

LA CARD	LOCAL LATITUDE	LA CARD

The latitude is used to calculate the Coriolis force.

Field	Variable	Value	Description
0,C1-2	IC1	LA	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment starting with KMAT
		T	Option 2: Assignment by material type
1	KMAT	+	Element material type
2	OMEGA	+	Local latitude (degrees)

Note: In general, a material type which contains nodes with specified water surface elevations (e.g. at an ocean boundary) should be assigned an OMEGA value of 0. This prevents instability along the boundary due to the water surface slope introduced by the Coriolis Force.

Note: if the LA card is omitted,
OMEGA = 0.0

ND CARD	2D/3D INTERFACE DISTRIBUTION	ND CARD

Field	Variable	Value	Description
0,C1-2	IC1	ND	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment of all node number.
2	VMIN	+	Coefficient to describe the vertical velocity distribution at externally specified flow boundaries. Used in the expression: V=VAVE*(VMIN+(1.0-VMIN)*(POWER+1)*Z/H**POWER), where VAVE (ft/sec) is the average velocity, Z(feet) is the elevation above the bottom, and H(feet) is the depth.
3	POWER	+	Described for VMIN.
4	UMIN	+	Coefficient to describe the vertical velocity distribution at a 2D/3D interface. Used in the expression: U=UAVE*(UMIN+(1.0-UMIN)*(PWERIN+1)*Z/H**PWERIN) ,where UAVE (ft/sec) is the average velocity, Z(feet) is the elevation above the bottom, and H(feet) is the depth.
5	PWERIN	+	Described for UMIN
6	CMIN	+	Coefficients used to describe the salinity-temperature-suspended sediment distribution at a 2D/3D transition. Used in the expression: C=CAVE*(CMIN+(1.0-CMIN)*(CPR+1)*Z/H**CPR) where Z(feet) is the elevation above the bottom, and H(feet) is the depth.
7	CPR	+	Describe for CMIN.

NOTE: Units are based upon SI card designation.

Note : if the ND card is omitted, U = UAVE, V = VAVE, and C = CAVE at every point in the water column at the boundary or interface.

PE CARD	CONTROL OF THE HORIZONTAL EDDY VISCOSITY AND DIFFUSION COEFFICIENT BY PECLET NUMBER	PE CARD

Field	Variable	Value	Description
0,C1-2	IC1	PE	Card group identifier
0,C3	IC3	b/	**Option 1**: Universal asignment by node
		T	**Option 2**: Assignment by material type.
1	IPEC NMAT	0,1 +	**Option 1**: On/Off switch for Peclet number control. IPEC = 1 turns on Peclet number control. **Option 2**: Material type for the Peclet parameter assignment.
2	GPEC	+	Peclet number for turbulent exchange
3	GPECD	+	Peclet number for diffusion
4	VPEC	+	Velocity used to generate the minimum allowable turbulent exchange and diffusion coefficients.
5	SFPEC	+	Scale factor used to find the isotropic values of the turbulent exchange and diffusion coefficients. It defines the ratio of the isotropic values to the directional values (see below). This ratio should be ≤ 1.

Note: The instantaneous magnitude of the horizontal eddy viscosity is found from the Peclet number according to the following formula:

$$E = \rho|V|dx/P$$

where E is the eddy viscosity, P is the Peclet number, ρ is the density of water, |V| is the velocity magnitude, and dx is the characteristic element length (which is the square root of the surface area of the element).

The instantaneous direction of the eddy viscosity is in the direction of flow

The instantaneous magnitude of the horizontal diffusion coefficient is found from the Peclet number according to the following formula:

$$D = |V|dx/P$$

RA CARD	**Rainfall and Evaporation**	**RA CARD**

Field	Variable	Value	Description
0,C1-2	IC1	RA	Card group identifier
0,C-3	IC3	b/	**Option 1:** Universal assignment by element
		E	**Option 2:** Assignment by element
		T	**Option 3:** Assignment by material type
1	J	+ + +	**Option 1:** The starting element number **Option 2:** The element number **Option 3:** The element material type number
2	SIDF	-,0,+	The elemental inflow in inches/hr (or cm/hr). Positive values represent rainfall (inflow), negative values represent evaporation (outflow).

NOTE: Junction element and other elements with material types greater than 900 cannot be assigned rainfall or evaporation

RD CARD	ROUGHNESS ASSIGNMENT BY DEPTH	RD CARD

Field	Variable	Value	Description
0,C1-2	IC1	RD	Card group identifier
0,C3	IC3	b/	Option 1: Universal assignment for entire grid.
		T	Option 2: Assignment by element material type (KMAT)
1	ISTART	+	First value for the global assignment to begin. Element material type or element number as indicated by the value of IC3.
2	IRUFF	0,+	ON/OFF switch for auto Manning'N-value calculations based upon the local depth. Negative or zero turns the option off. Positive value turns the option on and sets the defaults as in the table below.
3	RDRO	0,+	N-value for non-vegetated water. If IZBA = 0, this should be a maximum value. If IZBA = 1, this should be an average value. Any positive number will override the default for RDR0.
4	RDDO	0,+	Depth at which vegetation effects roughness. Any positive number will override the default for RDD0.
5	RDRM	0,+	N-value for vegetation water. Any positive number will override the default for RDRM (NOTE: RDRM = 0 for all 3-D elements).
6	RDCOEF	0,+	Roughness by depth coefficient in the following equation: (positive value will override the default)
7	IZBA	0,1	Toggle for automatic assignment of RDCOEF based on the instantaneous depth to roughness height ratio. A value of 0 deactivates the option. A value of 1 activates the option.

NVALUE=RDRO/(DEPTH**RDCOEF)+(RDRM*EXP(-DEPTH/RDDO))

NOTE: Default parameters are set depending on the value of IRUFF:

=1 settings for the Miss. River Delta project:
RDRO=.02 RDDO=2.0 RDRM=.026 RDCOEF=.08

=2 settings for S-shaped River example test case
RDRO=.04 RDDO=4.0 RDRM=.040 RDCOEF=.166667

=3 settings for San Francisco Bay Estuary project
RDRO=.04 RDDO=2.0 RDRM=.040 RDCOEF=.166667

SI CARD	SYSTEM INTERNATIONAL UNITS	SI CARD

Field	Variable	Value	Description
0,C1-2	IC1	SI	Card group identifier
1	IMETRIC	0,1	= 0 English units are applied(default is (gravity =32.2ft/sec^2) = 1 Metric units are expected as input and also used for output. (gravity = 9.80 m/sec^2)

NOTE: If no SI card is present, English units are used. The SI card must be placed before the $L card.

SM CARD	**CONTROL OF THE HORIZONTAL EDDY VISCOSITY AND DIFFUSION COEFFICIENT BY SMAGORINSKY**	**SM CARD**

Field	Variable	Value	Description
0,C1-2	IC1	SM	Card group identifier
0,C3	IC3	b/	Universal assignment
		T	Assignment by material type.
1	NMAT	+	Material type for the Smagorinsky parameter assignment.
2	TBFACT	+,0,-	Smagorinsky coefficient for turbulent exchange. A negative value applies the default coefficient (= 0.1)
3	TBFACTS	+,0,-	Smagorinsky coefficient for diffusion. A negative value applies the default coefficient (= 0.1)
4	TBMINF	+,0,-	Minimum turbulence exchange factor. A negative value applies the default coefficient (= 1.0)
5	TBMINFS	+,0,-	Minimum diffusion factor. A negative value applies the default coefficient (= 1.0)

Note: a SM card will override EV, DF, and PE cards.

The Smagorinsky coefficient (TBFACT and TBFACTS) can vary from approximately 0.094 to 0.2. The optimum value has been found to be approximately 0.1 for a trapezoidal channel, with higher values for more heterogeneous systems such as estuaries (See Thomas, T.G. and Williams, J.J.R. "Large Eddy Simulation of a Symmetric Trapezoidal Channel at Reynolds number of 430,000" Journal of Hydraulic Research, Vol.33 No. 6, 1995.)

The minimum turbulence exchange and diffusion factors (TBMINF and TBMINFS) are used to find the minimum turbulence exchange and diffusion coefficients (E_{min} and D_{min}) as follows:

$$E_{min} = \text{TBMINF} \times \rho \times V_{min} \times dx / 40$$

$$D_{min} = \text{TBMINFS} \times V_{min} \times dx / 40$$

Where V_{min} = 0.2 ft/sec (0.061 m/s) and dx = the square root of the surface area of the element.

Also, if $|V| < \text{TBMINF} \times V_{min}$, E_{min} is applied, regardless of the value of the turbulence exchange coefficient resulting from the Smagorinsky calculation. This is done to inhibit numerical instability in areas with both extremely small velocities and high velocity gradients.

ST CARD	STOP THE TABS-MDS SIMULATION	ST CARD

Field	Variable	Value	Description
0,C1-2	IC1	ST	Card group identifier
0,C3	IC3	0	Card type identifier
2-10	FLD	A	May be used for comments

TIS CARD	TIMING, STEADY STATE	TIS CARD

Required

Field	Variable	Value	Description
0,C1-2	IC1	TIS	Card group identifier
1	NITI	+,0	The number of iterations for an initial solution. For each iteration include the following set(s) of control numbers:
2	IURVL(I)	+,0	The degree of under-relaxation: = 0 relaxation factor = 1.0 (No active under-relaxation) = 1 relaxation factor = 0.9 ...etc = 9 relaxation factor = 0.1
3	ITLVL(I)	+,0	Gaussian level: = 0 normal = 1 reduced order
4	ITEQV(I)	+,0	Active equations: = 0 velocity, depth and quality constituent = 1 velocity and depth = 2 quality constituent only
5	ITEQS(I)	+,0	Active quality constituent types: = 0 salinity = 1 temperature = 2 suspended sediment

NOTE: Repeat fields 2-5 until NITI sets are entered.
If a continuation card is necessary, start in field 1 of the next TIS card and continue entering values for IURVL..ITEQS.

TID CARD	TIMING, DYNAMIC ITERATIONS	TID CARD

Required for dynamic calculations

Field	Variable	Value	Description
0,C1-2	IC1	TID	Card group identifier
1	NITN	+,0	The number of iterations for a dynamic solution. For each iteration include the following set(s) of control numbers:
2	IURVL(I)	+,0	The degree of under-relaxation: = 0 relaxation factor = 1.0 (No active under-relaxation) = 1 relaxation factor = 0.9 = 9 relaxation factor = 0.1
3	ITLVL(I)	+,0	Gaussian level: = 0 normal = 1 reduced order
4	ITEQV(I)	+,0	Active equations: = 0 velocity, depth and quality constituent = 1 velocity and depth = 2 quality constituent only
5	ITEQS(I)	+,0	Active quality constituent types: = 0 salinity = 1 temperature = 2 suspended sediment

NOTE: Repeat fields 2-5 until NITN sets are entered.
If a continuation card is necessary, start in field 1 of the next TID card and continue entering values for IURVL..ITEQS.

TO CARD	TIMING OUTPUT CONTROL OF BINARY RESULTS	TO CARD

Field	Variable	Value	Description
0,C1-2	IC1	TO	Card group identifier
0,C3	IC3	b/	Universal assignment for entire domain
1	IRSAV	0,+	Dynamic time step number to start saving binary results (default=0)

NOTE: All time steps will save if the TO-card is not present.

TR CARD	TRACE PRINT CONTROL	TR CARD

Field	Variable	Value	Description
0,C1-2	IC1	TR	Card group identifier
1	IPRT	0,+	Control for output printing: = 0 node and element suppressed = 1 all input is printed, except the initial conditions. = 2 Hotstart initial conditions are printed
2	NPRTF	+	Iteration frequency for printing the full solution. (example: a 4 provides full print every 4th iteration)
		-	Time step frequency for printing the full solution. (example: a -4 provides full print every 4th time step)
3	ITRACE	+	Debug trace print of all major subroutine calls

Note: if the TR card is omitted,

IPTR = 0
NPRTF = 1
ITRACE = 0

TRN CARD	NODAL LIST FOR SPECIAL SUMMARY TRACE PRINT	TRN CARD

Field	Variable	Value	Description
0,C1-2	IC1	TRN	Card group identifier
0,C3	IC3	N	Card type identifier
1-10	NSPLPT(I)	+	List of node numbers for special print summary.

NOTE: Multiple TRN cards may be required to enter all requested nodes.

TS CARD	ELAPSED TIME SET	TS CARD

Field	Variable	Value	Description
0,C1-2	IC1	TS	Card group identifier
1	+	ITET	Toggle. A 1 turns the option on , a 0 turns it off
2	+	TET	The total elapsed time.

NOTE: This card is not required.

TZ CARD	COMPUTATION TIME CONTROL	TZ CARD

Required for dynamic calculations

Field	Variable	Value	Description
0,C1-2	IC1	TZ	Card group identifier
1	NCBC	+	Not used. Fill with a zero.
2	NSTART	+	Starting time step - used to skip through the boundary condition data file for restart.
		-	Read starting time step from HOTSTART file
3	NCYC	+	Number of time steps to be simulated.
4	DELT	+	Initial length of a time step (hours) OR the time increment (hours) for this step of a dynamic simulation.
5	TMAX	+	Maximum time for a simulation. This is the total elapsed time, including the time written to the hotstart file (if one is present)
6	ALPHA	+	Variable used to calculate the temporal derivative
		-	Negative value defaults to 1.0 (Value of 1.5 is second order Taylor expansion)

ZB CARD	ZERO BOTTOM VELOCITY CONTROL	ZB CARD

Field	Variable	Value	Description
0,C1-2	IC1	ZB	Card group identifier
1	BLRTH	+	The thickness of the bottom layer, defined as a ratio of the bottom layer thickness to the local depth (i.e. value must be between 0 and 1)

BC CARD	GENERAL BOUNDARY CONDITION CONTROL	BC CARD

Boundary condition control, parameters may be specified by node or by continuity line number for which salinity, temperature, and suspended sediment will be specified. Initial and dynamic solutions.

Field	Variable	Value	Description
0,C1-2	IC1	BC	Card group identifier
0,C3	IC3	L	Option 3: Boundary condition control, parameters specified by continuity line number(s) for which salinity, temperature and suspended sediment will be specified. Initial and dynamic solutions.
		N	Option 4: Boundary condition control parameters specified by node number.
1	J	+	node or continuity line number
2	NFIX(J)	+	Velocity/flow boundary condition for the X direction for this surface node and all other nodes below node J. = 0 no specification = 1 specify the velocity in SPEC(J,1) = 3 specify the total flow in SPEC(J,1) NOTE: parallel slip boundaries are automatically entered.
3	NFIX(J)	+	Velocity/flow boundary condition for the Y direction for this surface node and all nodes below same. = 0 no specification = 1 specify the velocity in SPEC(J,2) = 3 specify the total flow in SPEC(J,2)
4	NFIX(J)	+	Elevation boundary condition for = 0 no specification = 2 specify water surface elevation in SPEC(J,3).
5	NFIX(J)		Salinity boundary condition for this surface node and all nodes below same =0 no specification =1 specify for all flow directions =2 specify salinity only for flow into the network
6	NFIX(J)	+,0	Temperature boundary condition for this surface node and all nodes below same. = 0 no specification = 1 specify temperature for all flow directions in SPEC (J,5) below. = 2 specify temperature only for flow into the network in SPEC(J,5) below.

7	NFIX(J)	+,0	specify suspended sediment boundary conditions for this surface node and all nodes below same. = 0 no specifications = 1 specify suspended sediment for all flow directions in SPEC(J,6) below. = 2 specify suspended sediment only for flows into the network in SPEC(J,6) below.
8	SPEC(J,1)	+,0	The specified X direction flow or velocity as appropriate (ft^3/sec/ft or ft/sec).
9	SPEC(J,2)	+,0	The specified Y direction flow or velocity as appropriate (ft3/sec/ft or ft/sec).
10	SPEC(J,3)	+,0	The specified water surface elevation (feet).
11	SPEC(J,4)	+,0	The specified value of salinity (concentration units).
12	SPEC(J,5)	+,0	The specified value of temperature (degrees).
13	SPEC(J,6)	+,0	The specified value of suspended sediment (concentration units).

NOTES: Enter 31XXXX as values for NFIX when flows per unit width is required, with components in the X and Y directions in SPEC(J,1) and SPEC(J,2), respectively. For the case where the X component is 0.0, enter 13XXXX.

Flow or velocity and elevation may not both be defined at a node except at corners in the network.

Option 2 for salinity-temperature-suspended sediment specifications is most useful in conjunction with specified water surface elevation conditions.

BH CARD	BOUNDARY, HEAD	BH CARD

Field	Variable	Value	Description
0,C1-2	IC1	BH	Card group identifier
0,C3	IC3	L	Option 2: Assignment by continuity line number
		N	Option 3: Assignmnet by node number
1	JBH	+	Continuity line number
2	ELEBH	+	Specified elevation for all nodes on this continuity line.(ft or m)
3	QQALBH(1)	-,0,+	Salinity concentration of the inflow (ppt). A negative value indicates no specification.
4	QQALBH(2)	-,0,+	Temperature of the inflow (degrees C) A negative value indicates no specification.
5	QQALBH(3)	-,0,+	Suspended sediment concentration of the inflow (kg/m^3). A negative value indicates no specification.

BQ CARD	CONTROL FOR SPECIAL BOUNDARIES	BQ CARD

The control variables NSID and IQGEN are self counted based upon the boundary cards read.

Field	Variable	Value	Description
0,C1-2	IC1	BQ	Card group identifier
0,C3	IC3	T	Option 2: Assignment by material type
		E	Option 3: Assignment by element number
		L	Option 4: Assignment by continuity line number.

For Option 2 or 3 only:

1	J	+	element or material number
2	SIDF(J)	+	flow per unit area (cfs/ft^2 or m/s) or the length as appropriate to the element type.
3	SIDQ(J,1)	+	Salinity of the inflow (outflow is removed at ambient salinity)
4	SIDQ(J,2)	+	Temperature of the inflow (outflow is removed at ambient temperature)
5	SIDQ(J,3)	+	Suspended sediment concentration of the inflow (outflow is removed at ambient suspended sediment concentration).

For Option 4 only:

1	L	+	Continuity line number
2	TOTBQ(L)	+	Total flow (CFS or m^3/s) crossing the continuity line
3	DIRBQ(L)	+	Direction of flow (radians measured anti-clock-wise). Note that the boundary directions are adjusted to maintain parallel flow.
4	QQALBQ(L,1)	+,0	Salinity of the inflow (neglect if negative)
5	QQALBQ(L,2)	+,0	Temperature of the inflow (neglect if negative)
6	QQALBQ(L,3)	+,0	Suspended sediment concentration of the inflow. (Neglect if negative)

BR CARD	BOUNDARY, CONTINUITY FOR ELEVATION-FLOW	BR CARD

The control variable ISTGEN is self counted based upon the boundary BRC cards read.

Field	Variable	Value	Description
0,C1-2	IC1	BRC	Card group identifier
0,C3	IC3	L	Card type identifier
1	L	+	Continuity line number
2	AC1X(L)	+	coefficients in the elevation-flow relationship (cfs) for continuity line J given by the expression:Q+A1+A2*(ELEV-EO)**C
3	AC2X(L)	+	same as above
4	AC3X(L)	+	same as above
5	AC4X(L)	+	same as above
6	AC5X(L)	+	Direction of the flow (radians measured counter-clock-wise). Note that the boundary conditions are adjusted to maintain parallel flow.
7	QQALBR(1)	+	Salinity of the inflow (neglect if negative)
8	QQALBR(2)	+,0	Temperature of the inflow (neglect if negative)
9	QQALBR(3)	+,0	Suspended sediment concentration of the inflow (neglect if negative)

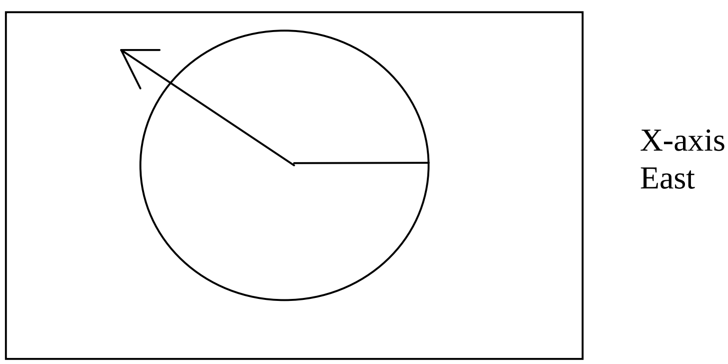
BS CARD	BOUNDARY, TEMPERATURE/SALINITY RELATIONSHIP	BS CARD

Field	Variable	Value	Description
0,C1-2	IC1	BS	Card group identifier
0,C3	IC3	L	Card type identifier
1	JBS	+	continuity line number
2	QQALBS(1)	+	Salinity of inflow (neglect if negative)
3	QQALBS(2)	+,0	temperature of inflow (neglect if negative)
4	QQALBS(3)	+,0	suspended sediment of inflow (neglect if negative)

BW CARD	WIND SPEED AND DIRECTION	BW CARD

Field	Variable	Value	Description
0,C1-2	IC1	BW	Card group identifier
0,C3	IC3	b/	Option 1: The wind data in fields 2 and 3 of this card will be used at all nodes equal to or greater than J1
		N	Option 2: Wind data are coded by specific node
		E	Option 3: Wind data are coded by element number
		T	Option 4: Wind coded by IMAT number (material type)
1	J1	+	The node or element or IMAT number as specified by IC3
2	TWX(J1)	+,0	The wind velocity @ wse + 10 meters (miles/hr)
3	TAX(J1)	+,0	Direction toward which the wind is blowing, measured in degrees counterclockwise from the positive x-axis.

For example, a SE wind, as reported by the conventional meteorological terms, blows toward the NW. This would be an angle of 135 degrees counterclockwise form a positive x-axis (with the + x-axis oriented to the east).



Note: if the raw wind direction data is given in the conventional format (i.e. direction from which the wind is blowing, measured in degrees clockwise from the positive y-axis) the angle (θ) can be transformed to the appropriate angle for TABS-MDS input (θ′) by applying the following conversion:

$$\theta' = 270° - \theta$$

VI CARD	VELOCITY INPUT	VI CARD

Field	Variable	Value	Description
0,C1-2	IC1	VI	Card group identifier
1	IRDVEL	2,1,0	Toggle for turning on/off the option to input velocities from a TABS-MDS solution file. IRDVEL = 0 turns the option off. IRDVEL = 1 turns the option on and assumes the velocities are in metric units IRDVEL = 2 turns the option on and assumes the velocities are in English units (i.e. TABS-MDS converts them to metric units) (default is IRDVEL = 0)
2	TRDMIN	+,0,-	The minimum time to be read from the TABS-MDS solution file (hours)
3	TRDMAX	+,0,-	The maximum time to be read from the TABS-MDS solution file (hours)

NOTE: If the sediment run requires more time steps than are present in the time window delineated with TRDMIN and TRDMAX on the TABS-MDS solution file, the file is automatically rewound and the first time step is reread (i.e. the velocity time series repeats).

xx CARD	**TTTTTTT**	**XX CARD**

Field	Variable	Value	Description
0,C1-2	IC1	xx	Card group identifier

NOTE: xx

MG CARD	**MULTIPLE GRAIN SPECIFICATION**	**MG CARD**

Field	Variable	Value	Description
0,C1-2	IC1	CC	Card group identifier
1	NGS	+	number of grain sizes. NOTE: grain size #1 is ALWAYS the clay fraction
2 - NGS+1	IPGS(IGS)	+	Number of iterations for each grain size

SC CARD	SILTS CONSTANTS	SC CARD

Field	Variable	Value	Description
0,C1-2	IC1	CC	Card group identifier
1	IGS	+	sediment grain size
2	TAUECS(IGS)	+	Critical shear stress for erosion (lbf/ft^2 or N/m^2)

Note: Since grain size 1 represents the clay fraction, it would seem that a critical shear stress for erosion need not be specified for grain size 1 (the critical shear stress for erosion of the clay layer is specified via the CC card). However, in general, the critical shear stress for deposition for grain size N is equal to the critical shear stress for erosion for grain size N-1. Hence, a value of the critical shear stress for erosion SHOULD be specified for grain size 1, in order to supply a value of the critical shear stress for deposition for grain size 2.

NC CARD	CONSOLIDATION CONSTANTS	NC CARD

Field	Variable	Value	Description
0,C1-2	IC1	CC	Card group identifier
1	IGS	+	sediment grain size
2	WHO(IGS)	+	Nominal settling velocity (ft/sec or m/s). Default =
3	WH1(IGS)	+,0	Consolidation exponent Default =
4	WH2(IGS)	+	Consolidation coefficient Default =

NOTE: The values given above are needed to solve for the bed settling velocity in each bed layer. The bed settling velocity (WH) for a particular bed layer is a function of the sediment concentration (CS) in the layer. The expression for WH as a function of CS is as follows:

$$WH = WHO \times (1 - WH2 \times CST)^{WH1}$$

Where CST is the total sediment concentration in a given layer, and WHO,WH1, and WH2 are weighted averages (by sediment fraction) of the values of these parameters for all grain sizes.

Note also that WHO is also used as the value of the hindered settling velocity for suspended transport.

CC CARD	**CLAY CONSTANTS**	**CC CARD**

Field	Variable	Value	Description
0,C1-2	IC1	FC	Card group identifier
1	TAUDC	+,0	Critical shear stress for deposition. This is the shear stress below which deposition will occur (lbf/ft^2 or N/m^2). Default =
2	TEC1	+	Nominal critical shear stress for erosion. (lbf/ft^2 or N/m^2) Default =
3	TEC2	+,0	Critical shear stress exponent Default =
4	PRC1	+	Erosion rate constant coefficient Default =
5	PRC2	+	Erosion rate constant exponent Default =
6	ESSE	+	Excess shear stress exponent (the recommended range for this value is between 1 and 3)
7	CS1M	+	Maximum allowable silt fraction

NOTE: The critical shear stress for erosion (TAUEC) is the shear stress above which erosion will occur. It is a function of the sediment concentration (CS) of a particular layer. The expression for TAUEC as a function of CS is as follows:

$$\text{TAUEC} = \text{TEC1} \times \text{CS}^{\text{TEC2}}$$

The erosion rate constant (PERC) is a function of TAUEC. The expression for PERC as a function of TAUEC is as follows:

$$\text{PERC} = \text{TAUEC} \times 200 \times \text{EXP}(-\text{PRC1} \times \text{TAUEC}^{\text{PRC2}})$$

HN CARD	**BED ROUGHNESS ASSIGNMENT**	**HN CARD**

Field	Variable	Value	Description
0,C1-2	IC1	HN	Card group identifier
0,C3	IC3	b/	**Option 1**: global assignment
		T	**Option 2**: assignment by material type
1	J		**Option 1**
		+	User specifies the value in data field 2 for all material types ≥ J
			Option 2
			User specifies the value in data field 2 for material type J
2	XNVALU(J)	+	If the quantity in data field 2 is positive, a Manning's n value is specified.
	XESRH(J)	-	If the quantity in data field 2 is negative, a roughness height is specified (ft or m). The roughness height is assigned a value equal to the absolute value of the quantity given in data field 2.

NOTE: If any material type is not assigned a roughness with a HN or HNT card, that material type will be assigned the Manning's n value specified on the EV or EVT card which pertains to it.

DR CARD	**DRAG REDUCTION**	**DR CARD**

Field	Variable	Value	Description
0,C1-2	IC1	DR	Card group identifier
0,C3	IC3	/b	**Option1:** Global assignment
		N	**Option2:** Assignment by node
		E	**Option3:** Assignment by element
		T	**Option4:** Assignment by material type
1	J	+	**Option1:** User specifies value for all nodes ≥ J
		+	**Option2:** User specifies value for node J
		+	**Option3:** User specifies values for all nodes in element J
		+	**Option4:** User specifies values for all nodes in material type J
2	SGRF(J)	+	Ratio of the drag at the bed to the total drag. Used in the presence of dense vegetation to eliminate form drag in the calculation of the applied bed shear stress.

IB CARD	**INITIAL BED CONDITIONS**	**IB CARD**

Field	Variable	Value	Description
0,C1-2	IC1	IB	Card group identifier
0,C3	IC3	b/	**Option 1**: global assignment
		N	**Option 2**: assignment by node
		T	**Option 3**: assignment by material type
1	J	+	**Option 1**
			Use the default values for data fields 2 - NBLAY + 2 for all nodes ≥ J
		+	**Option 2**
			Use the default values for data fields 2 - NBLAY + 2 for node J
		+	**Option 3**
			Use the default values for data fields 2 - NBLAY + 2 for material type J
2	NBLAY	+	Number of bed layers
3 - ?	HS0	+,0	Initial thickness of each bed layer (ft or m). There must be NBLAY values given.

NOTE: If a continuation card is necessary, start in field 1 of the next IB? card. Continue entering values for HS0 until NBLAY values have been entered.

Also note that NBLAY must be assigned the same value as the value given on the LD card(s).

LD CARD	**BED LAYER DENSITY**	**LD CARD**

Field	Variable	Value	Description
0,C1-2	IC1	LD	Card group identifier
0,C3	IC3	b/	**Option 1**: global assignment
		N	**Option 2**: assignment by node
		T	**Option 3**: assignment by material type
1	J	+	**Option 1**
			Use the default values for data fields 2 - NBLAY + 2 for all nodes ≥ J
		+	**Option 2**
			Use the default values for data fields 2 - NBLAY + 2 for node J
		+	**Option 3**
			Use the default values for data fields 2 - NBLAY + 2 for material type J
2	NBLAY	+	Number of bed layers
3	IGS	+	Sediment grain size
4 - ?	CS(J,NBLAY, IGS)	+	Mass concentration of sediment in each bed layer (kg/m^3). There must be NBLAY values given.

NOTE: If a continuation card is necessary, start in field 1 of the next LD? card. Continue entering values for CS until NBLAY values have been entered.

Also note that NBLAY must be assigned the same value as the value given on the IB card(s).

WC CARD	FALL VELOCITY	WC CARD

Field	Variable	Value	Description
0,C1-2	IC1	WC	Card group identifier
1	MSETV	+	Toggle for dependence of fall velocity on concentration = 0 fall velocity is everywhere equal to the free settling velocity = 1 fall velocity is dependent on concentration
2	STLRGM1	+	Concentration threshold 1 Default = 0.1 kg/m^3
3	HID	+,0	Hiding factor. The fraction of small grains hidden by larger ones during deposition.

WM CARD	**FALL VELOCITY FUNCTION**	**WM CARD**

See the note below for an explanation of how this card is applied.

Field	Variable	Value	Description
0,C1-2	IC1	WF	Card group identifier
1	IGS	+	Sediment grain size
2	SRF2(IGS)	0,+	Concentration threshold 2 Default = 10.0 kg/m^3
3	WSPOW(IGS)	+	Settling exponent.

NOTE: At high enough sediment concentrations, the settling rates of cohesive sediments are observed to be a function of the concentration in the water column. This card allows the user to define 2 threshold concentration values that are used to generate a fall velocity function which depends on the sediment concentration (STLRGM1 AND STLRGM2). The expression for this function is given below:

IF STLRGM1 ≥ C

$$WS(GS) = WHO(GS)*(SLTRGM1/SRF2)^{WSPOW}$$

IF SRF2 ≥ C > STLRGM1

$$WS(GS) = WHO(GS) \times (C/SRF2)^{WSPOW}$$

IF C > SRF2

$$WS(GS) = WHO(GS)$$

Where SRF2 and WSPOW are weighted averages (by sediment fraction) of the values of these parameters for all grain sizes.

WA CARD	FALL VELOCITY ATTENUATION	WA CARD

Field	Variable	Value	Description
0,C1-2	IC1	WA	Card group identifier
0,C3	IC3	E	Assignment by element number
		T	Assignment by material type
1	WSATEN	+	Fall velocity attenuation factor. The default = 1.0

BD CARD	**BOUNDARY GRAIN-SIZE DISTRIBUTION**	**BD CARD**

Field	Variable	Value	Description
0,C1-2	IC1	BD	Card group identifier
0,C3	IC3	L	Assignment by continuity line number
1	J	+	Continuity line number
2	NGS	+	Number of grain sizes
3-NGS+2	RPCB(NGS)	+	Fraction of each grain size to be applied at the boundary.

NOTE: This card governs the grain size distribution at a boundary. The total suspended sediment concentration at the boundary is given on the appropriate boundary specification card (e.g. BHL, BQL). The values given for RPCB should represent the fraction of each grain class to be applied at the boundary. Hence the sum of RPCB(I), for I=1,NGS should equal 1.0

DD CARD	**DREDGE DISPOSAL**	**DD CARD**

Field	Variable	Value	Description
0,C1-2	IC1	DD	Card group identifier
0,C3	IC3	E	Assignment by element number
		T	Assignment by material type
1	J	+	Element or material type
2	IDDON	+	Toggle for activation of dredge disposal = 1 dredge disposal activated = 0 dredge disposal deactivated
3	NGS	+	Number of grain sizes
4	DUMP	+	Dredge disposal mass flux ($kg/m^2/s$)
5-NGS+4	RPCE(NGS)	+	Fraction of each grain size present in the disposal material

NOTE: The values given for RPCE should represent the fraction of each grain class present in the disposal material. Hence the sum of RPCE(I), for I=1,NGS should equal 1.0

UB CARD	UPDATE BED ELEVATIONS TOGGLE	UB CARD

Field	Variable	Value	Description
0,C1-2	IC1	UB	Card group identifier
1	IUBED	1,0	Toggle for turning on/off the real time update of the bed elevations as they are altered by deposition and scour. A value of 1 turns the option on, and value of 0 turns the option off. (default is IUBED = 1)

SA CARD	SAND TRANSPORT	SA CARD

Field	Variable	Value	Description
0,C1-2	IC1	SA	Card group identifier
1	EGS	+	The effective grain size of the sand (meters)
2	RPOROS	0-1	the porosity of the sand bed

xx CARD	TTTTTTT	XX CARD

Field	Variable	Value	Description
0,C1-2	IC1	xx	Card group identifier

NOTE: xx

VARIABLES	CARD LOCATION
AC1X(L)	BR
AC2X(L)	BR
AC3X(L)	BR
AC4X(L)	BR
AC5X(L)	BR
ALFAK(I)	GS
ALPHA	CA
AO(J)	GNN
CHI	CA
CMIN	ND
CONV(1)	CN
CONV(2)	CN
CONV(3)	CN
CONV(4)	CN
CONV(5)	CN
CONV(6)	CN
CORD(J,1)	GNN
CORD(J,2)	GNN
CPR	ND
DELT	TZ
DIRBQ(L)	BQ
DSET	DE
DSETD	DE
EDD1	EZ
EDD2	EZ
EDD3	EZ
ELEBH	BH
ELEV	IC
End of list	GC
ENDCOM	END
EXX	PE
EXY	PE
EYX	PE
EYY	PE
FLD	CO,ST
GPEC	PE
HMNN	IC
I	GL
IC1	$H,$L1,$L2,$M,T1-T3,CA,CN,CO,DE,DM,DF,DZ,END,EV,EZ,FD,G1,GO,GC, GE,GL,GNN,GS,GW,IC,LA, ND,PE,RD,SI,ST,TIS,TID, TO,TR,TRN,TZ,BC,BH,BQ, BR,BSL,BW

IC3	T1-T3,DZ,END,EV,EZ,FD, GL,GNN,GW,LA,ND,PE,RD, ST,TO,TRN,BC,BH,BQ,BR, BSL,BW
IDSWT	DE
IE	GO
IFILE	$L1
IFOT	$L2
IMAT(J)	GE
IMETRIC	SI
INHEC	$L1
INODE	GS
INUM	RD
IOPTZD	CA
IPASS1	FD
IPASS2	FD
IPASS3	FD
IPEC	PE
IPRT	TR
IRO	GO
IRSAV	TO
IRUFF	RD
ISPRT	$L2
ISTART	RD
ITEQS(I)	TIS,TID
ITEQV(I)	TIS,TID
ITLVL(I)	TIS,TID
ITRACE	TR
IURVL(I)	TIS,TID
IVRSID	$M
IZB	CA
J	DF,DZ,EV,EZ,GC,GE,GNN, BC,BQ
J1	BW
JBH	BH
JBS	BSL
KCONHOT	$H
KMAT	LA,PE
KSALHOT	$H
KTEMHOT	$H
L	BQ,BR
Line(J,K)	GC
LOUT	$L2
MHOT	$H
N	GW
NAINPT	$L1

NB	$L1

NCBC	TZ
NCONV	CN
NCYC	TZ
NDEP(I)	GL
NDP	GL
NFIX(J)	BC
NFIXH(IE)	GO
NITI	TIS
NITN	TID
NLL	$L2
NODE	FD
NOP(J,K)	GE
NOPT	$L2
NPRTF	TR
NSPLPT(I)	TRN
NSTART	TZ
OMEGA	LA
ORT(J,1)	EV
ORT(J,10)	DZ
ORT(J,11)	DF
ORT(J,2)	EV
ORT(J,3)	EV
ORT(J,4)	EV
ORT(J,5)	EV
ORT(J,6)	EZ
ORT(J,7)	EZ
ORT(J,8)	DF
ORT(J,9)	DF
POWER	ND
PWERIN	ND
QQALBH(1)	BH
QQALBH(2)	BH
QQALBH(3)	BH
QQALBQ(L,1)	BQ
QQALBQ(L,2)	BQ
QQALBQ(L,3)	BQ
QQALBR(1)	BR
QQALBR(2)	BR
QQALBR(3)	BR
QQALBS(1)	BSL
QQALBS(2)	BSL
QQALBS(3)	BSL
RDCOEF	RD
RDDO	RD
RDRM	RD
RDRO	RD

SALT	IC

SEDI	IC
SIDF(J)	BQ
SIDQ(J,1)	BQ
SIDQ(J,2)	BQ
SIDQ(J,3)	BQ
SPEC(J,1)	BC
SPEC(J,2)	BC
SPEC(J,3)	BC
SPEC(J,4)	BC
SPEC(J,5)	BC
SPEC(J,6)	BC
SS1(J)	GNN
SS1(N)	GW
SS2(J)	GNN
SS2(N)	GW
TAX(J1)	BW
TEMPI	IC
TH(J)	GE
THLAY(I,J)	GL
TITLE	T1-T3
TMAX	TZ
TOTBQ(L)	BQ
TWX(J1)	BW
UDIR	IC
UINP	IC
UMIN	ND
UNOM	IC
VINP	IC
VMIN	ND
VPEC	PE
WET	DM
WIDS(J)	GNN
WIDS(N)	GW
WIDTH(J)	GNN
WIDTH(N)	GW
XSCALE	G1
ZSCALE	G1