TELEMAC MODELLING SYSTEM

2D Hydrodynamics

TELEMAC-2D Software

Version 6.0

REFERENCE MANUAL

September 2010

This manual has been updated for version 6.0 by Pierre Lang, Ingerop
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EVOLUTIONS OF THE DOCUMENT

DATE	AUTHOR	EVOLUTION
09/2010	Pierre LANG *pierre.lang@ingerop.com*	General update for release 6.0

Typing conventions used in this manual

Keywords are written in *UPPER CASE ITALICS.*

TABLE OF CONTENT

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1 DETAILED LIST OF KEYWORDS

ABSCISSAE OF SOURCES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*ABSCISSES DES SOURCES*

Real numbers giving the abscissas of possible sources of flowrate and/or tracer in the domain (in metres).

Associated keywords:	*ORDINATES OF SOURCES*
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VELOCITIES OF SOURCES ALONG Y
	VALUES OF THE TRACERS AT THE SOURCES

ACCURACY FOR DIFFUSION OF TRACERS

Type:	Real
Dimension:	1
Default value:	1. E-6
French keyword:	*PRECISION POUR LA DIFFUSION DES TRACEURS*

Sets the level of accuracy required on the tracer in the diffusion step of the tracer transport equation.

ACCURACY OF EPSILON

Type:	Real
Dimension:	1
Default value:	1.E-9
French keyword:	*PRECISION SUR EPSILON*

Sets the level of accuracy required on epsilon in the diffusion and source terms step of the k-epsilon turbulence model equations.

ACCURACY OF K

Type:	Real
Dimension:	1
Default value:	1.E-9
French keyword:	*PRECISION SUR K*

Sets the level of accuracy required on k in the diffusion and source terms step of the k-epsilon turbulence model equations.

ADVECTION

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*CONVECTION*

Specifies if the advection terms are taken into account or not. If the response is positive, some advection terms may still be omitted using the keyword *ADVECTION OF*...

Associated keywords:	*ADVECTION OF H*
	ADVECTION OF U AND V
	ADVECTION OF K AND EPSILON
	ADVECTION OF TRACERS

ADVECTION OF H

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*CONVECTION DE H*

The advection of H is taken into account or ignored.

Associated keywords:	*ADVECTION*

ADVECTION OF K AND EPSILON

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*CONVECTION DE K ET EPSILON*

The advection of K and epsilon is taken into account or ignored.

Associated keyword:	*TURBULENCE MODEL*
	ADVECTION

ADVECTION OF TRACERS

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*CONVECTION DES TRACEURS*

The advection of the tracers is taken into account or ignored.

Associated keywords:	*ADVECTION*

ADVECTION OF U AND V

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*CONVECTION DE U ET V*

The advection of velocities is taken into account or ignored.

Associated keywords:	*ADVECTION*

AIR PRESSURE

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*PRESSION ATMOSPHERIQUE*

Specifies whether the influence of an atmosphere fields is taken into account

BINARY DATA FILE 1

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE DONNEES BINAIRE 1*

Data file in binary format at the user's disposal. The data in this file are read on Fortran channel 24.

BINARY DATA FILE 2

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE DONNEES BINAIRE 2*

Data file, in binary format at the user's disposal. The data in this file are read on Fortran channel 25.

BINARY RESULTS FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE RESULTATS BINAIRE*

Binary coded results file at the user's disposal. The results to be placed in this file should be written on Fortran channel 28.

BOTTOM SMOOTHINGS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*LISSAGES DU FOND*

Specifies the number of smoothings on bottom topography. Each smoothing is mass conservative. To be used when interpolation of bathymetry on the mesh gives very rough results.

BOTTOM SURFACES DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES SURFACES DU FOND*

Results file for coupling with Delwaq

BOTTOM TOPOGRAPHY FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES FONDS*

Name of optional file containing the bathymetric data associated with the mesh. If this keyword is used, this bathymetric data will be used for the computation.

BOUNDARY CONDITIONS FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES CONDITIONS AUX LIMITES*

Name of file containing boundary conditions. This file is usually generated by MATISSE or FUDAA-PREPRO. If the mesh generator being used is interfaced with the TELEMAC-2D system, this file is filled automatically by STBTEL using the colour codes attributed to the nodes of the computational domain boundaries.

COEFFICIENT FOR DIFFUSION OF TRACERS

Type:	Real
Dimension:	variable
Default value:	1.E-6
French keyword:	*COEFFICIENT DE DIFFUSION DES TRACEURS*

Sets the value of the tracer diffusivity. The number of supplied values must be consistent with the number of tracers. This value has a strong influence on the behaviour of the tracer.

COEFFICIENT OF WIND INFLUENCE

Type:	Real
Dimension:	1
Default value:	0.0
French keyword:	*COEFFICIENT D'INFLUENCE DU VENT*

Sets the wind influence coefficient (see Formulation Document concerning the value to be provided).

Associated keyword: *WIND*

COMPATIBLE COMPUTATION OF FLUXES

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*CALCUL COMPATIBLE DES FLUX*

Fluxes through control sections will be computed in a way compatible with the weak formulation of impermeability of solid boundaries.

COMPUTATION CONTINUED

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*SUITE DE CALCUL*

Determines whether the computation to be run is independent of any other result or is a continuation of a previous computation.

NO: This is the first run for this computation, and a complete set of initial conditions must be defined.

YES: This is a continuation of a previous computation: the initial conditions are obtained from the last time step of the *PREVIOUS COMPUTATION FILE* indicated in the steering file used to submit the computation. Besides, all the data in the steering file may be redefined; this offers the possibility of changing, for example, the time step, turbulence model or friction and adding or removing a tracer. In addition, the boundary conditions must be defined (`BORD` subroutine or values placed in the steering file), and can also be modified.

Associated keyword: *PREVIOUS COMPUTATION FILE*
INITIAL TIME SET TO ZERO

CONTINUITY CORRECTION

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*CORRECTION DE CONTINUITE*

Corrects velocity on particular boundary points with prescribed elevation where the continuity has not been solved.

CONTROL OF LIMITS

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*CONTROLE DES LIMITES*

Checks the plausibility of the depth, velocity and tracer results. If the response is positive, the keyword: *LIMIT VALUES* must be supplied. The execution is automatically stopped if a value is outside the limits.

Associated keyword:	*LIMIT VALUES*

CONTROL SECTIONS

Type:	Integer
Dimension:	variable
Default value:	none
French keyword:	*SECTIONS DE CONTROLE*

Couples of points (global numbers in the mesh) defining sections where the instantaneous and cumulated discharges will be given. The results are printed in the output listing. The use of the *SECTIONS INPUT FILE* is now recommended and is mandatory in parallel mode.

Associated keyword:	*PRINTING CUMULATED FLOWRATES*
	SECTIONS INPUT FILE
	SECTIONS OUPUT FILE

CORIOLIS

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*CORIOLIS*

Specifies if the Coriolis force is taken into account.

Associated keyword:	*CORIOLIS COEFFICIENT*
	NORTH

CORIOLIS COEFFICIENT

Type:	Real
Dimension:	1
Default value:	0.0
French keyword:	*COEFFICIENT DE CORIOLIS*

Sets the Coriolis force coefficient (unit: s^{-1}). This must be computed as a function of latitude λ using the following formula:

$FCOR = 2\omega \sin(\lambda)$,

ω being the angular velocity of the earth ($\omega = 7{,}27 \times 10^{-5}$ rad/s).

The components of the Coriolis force are thus:

$FU = FCOR \times V$

$FV = - FCOR \times U$

Associated keywords:	*CORIOLIS*
	NORTH

COST FUNCTION

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*FONCTION COUT*

Specify the type of the cost function used for parameter estimation. The possibilities are: 1 for cost function based upon differences of depth and velocities, 2 for cost function based upon differences of celerity and velocities.

Associated keywords:	*IDENTIFICATION METHOD* *MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION* *PARAMETER ESTIMATION* *TOLERANCES FOR IDENTIFICATION*

COUPLING PERIOD

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE DE COUPLAGE*

To run Sisyphe with a larger time-step. Output periods will be automatically adapted to have results at the same time in both programmes.

Associated keywords:	*COUPLING WITH*

COUPLING WITH

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*COUPLAGE AVEC*

Give the name of the simulation code used for coupling :
- INTER-SISYPHE : Internal coupling with SISYPHE
- DELWAQ : will yield results file for DELWAQ

Associated keywords:	*SISYPHE STEERING FILE*

C-U PRECONDITIONING

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*PRECONDITIONNEMENT C-U*

This preconditioning consists in changing the depth variable by celerity in the final linear system. This option may be useful in coastal modelling but not so in river modelling.

DEBUGGER

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*DEBUGGER*

If 1, calls of subroutines will be printed in the listing

DEFINITION OF ZONES

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*DEFINITION DE ZONES*

Activate the call to the `DEF_ZONES` subroutine where the integer array `ZONE` is updated. This gives a zone number for each point of the mesh. The user must adapt the subroutine `DEF_ZONE`. The array could be used for friction coefficient initialisation.

When the parameter estimation is used, a different value of friction coefficient is computed for each zone.

DELWAQ PRINTOUT PERIOD

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE DE SORTIE POUR DELWAQ*

Printout period for Delwaq file.

DELWAQ STEERING FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE COMMANDE DELWAQ*

Results file for coupling with Delwaq

DENSITY EFFECTS

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*EFFETS DE DENSITE*

Specifies if the density effects is taken into account. If yes, the first tracer must be salinity, expressed in kg/m^3; density is then deduced from water salinity and mean temperature.

Associated keyword:	*MEAN TEMPERATURE*
	TRACER

DEPTH IN FRICTION TERMS

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*HAUTEUR DANS LES TERMES DE FROTTEMENT*

Sets the depth use un the friction terms. 1 means nodal depth and 2 means that the depth is average on the test function area. The second option has prved to be slightly better on dam break studies.

DESIRED COURANT NUMBER

Type:	Real
Dimension:	1
Default value:	1.
French keyword:	*NOMBRE DE COURANT SOUHAITE*

When the option *VARIABLE TIME-STEP* is selected, the time-step is modified so that the maximum Courant number does not exceed the value specified here.

Associated keyword:	*VARIABLE TIME-STEP*

DIAMETER OF ROUGHNESS ELEMENTS

Type:	Real
Dimension:	1
Default value:	0.006
French keyword:	*DIAMETRE DES ELEMENTS DE FROTTEMENT*

Used when there is a non-submerged vegetation friction. Specifies the diameter of roughness element

Associated keyword:	*NON-SUBMERGED VEGETATION FRICTION*

DIFFUSION OF TRACERS

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*DIFFUSION DES TRACEURS*

This is used to decide whether or not to take tracer diffusion into account.

DIFFUSION OF VELOCITY

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*DIFFUSION DES VITESSES*

This is used to decide whether or not to take velocity diffusion into account.

DIFFUSIVITY DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DE LA DIFFUSION*

Results file for coupling with Delwaq

Associated keyword:	*DIFFUSIVITY FOR DELWAQ*

DIFFUSIVITY FOR DELWAQ

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*DIFFUSION POUR DELWAQ*

Triggers output of diffusion for Delwaq.

Associated keyword:	*DIFFUSIVITY DELWAQ FILE*

DISCRETIZATIONS IN SPACE

Type:	Integer
Dimension:	2
Default value:	11; 11
French keyword:	*DISCRETISATIONS EN ESPACE*

2 numbers relative to velocity and depth.

11 : binary triangle,
12 : quasi-bubble triangle.
13 : quadratic triangle

The possible configurations are:

11;11 (default)	linear for velocity and depth
12;11	quasi-bubble velocity and linear depth
13;11	quadratic velocity and linear depth

Quadratic elements are not implemented for wave equation, parallelism and edge-base storage
The use of quasi-bubble element is no more recommended. When observing wiggles on free surface it is preferable to use the wave equation in association with FREE SURFACE GRADIENT COMPATIBILITY = 0.9.

DURATION

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*DUREE DU CALCUL*

Sets the total duration of the simulation (in seconds).

ELEMENTS MASKED BY USER

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*ELEMENTS MASQUES PAR L'UTILISATEUR*

The YES value allows the user to cut islands out of an existing mesh, by masking elements. In this case, the masked elements must be indicated in the user subroutine `MASKOB`. The limits created in this way will be treated as solid boundaries with slip condition.

EQUATIONS

Type :	Character
Dimension :	1
Default value :	“SAINT-VENANT EF”
French keyword :	*EQUATIONS*

Specifies the type of equations solved by TELEMAC-2D out of the following three options:

“ SAINT-VENANT EF ”	(Finite Element solution)
“ SAINT-VENANT VF ”	(Finite Volume solution)
“ BOUSSINESQ ”	(Boussinesq equations)

This key-word is the only one to skip from one option to the other, all the other data being compatible. However not all the options available with "SAINT-VENANT EF" are supported by SAINT-VENANT VF and BOUSSINESQ.

In finite volumes, the algorithm is explicit with a limitation of Courant number. You may thus have to use the following 2 key-words: *DESIRED COURANT NUMBER* and *VARIABLE TIME-STEP*

EXCHANGE AREAS DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES SURFACES DE FLUX*

Results file for coupling with Delwaq

EXCHANGES BETWEEN NODES DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES ECHANGES ENTRE NOEUDS*

Results file for coupling with Delwaq

FINITE VOLUME SCHEME

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*SCHEMA EN VOLUMES FINIS*

To choose between the different Finite Volume schemes.

0: Roe scheme

1: kinetic scheme, order 1

2: kinetic scheme, order 2

With finite volume schemes, the time-step is variable and automatically computed.

FORMATTED DATA FILE 1

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE DONNEES FORMATE 1*

Formatted data file at the user's disposal. The data in this file are read on Fortran channel 26.

Information about sills and culverts is in this file.

FORMATTED DATA FILE 2

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE DONNEES FORMATE 2*

Formatted data file at the user's disposal. The data in this file are read on Fortran channel 27.

FORMATTED RESULTS FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE RESULTATS FORMATE*

Formatted results file at the user's disposal. The results to be placed in this file should be written on Fortran channel 29.

FORTRAN FILE

Type:	Character
Dimension:	1
Default value:	'DEFAUT'
French keyword:	*FICHIER FORTRAN*

Name of Fortran file.

FOURIER ANALYSIS PERIODS

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*PERIODES D'ANALYSE DE FOURIER*

This is a list of periods for analysing the free surface variations (the mean level must be zero). The amplitude and phase will be given for every period and every point.

The results will be automatically added to the output file under the name « AMPLITUDE 1 », « AMPLITUDE 2 », etc. and « PHASE 1 », PHASE 2 », etc. Only the last time step is the correct value. The estimation of the duration for a correct analysis is left to the user. The key-word « NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS » can be used for defining the window analysis, to discard the setting up time for example.

Associated keyword:	*VARIABLES FOR GRAPHIC PRINTOUTS*

FREE SURFACE GRADIENT COMPATIBILITY

Type: Real
Dimension: 1
Default value: 1.
French keyword: *COMPATIBILITE DU GRADIENT DE SURFACE LIBRE*

Values less than 1 suppress spurious oscillations. To be used with the wave-equation optin

Associated keyword: *TREATMENT OF THE LINEAR SYSTEM*

FRICTION COEFFICIENT

Type: Real
Dimension: 1
Default value: 50.
French keyword: *COEFFICIENT DE FROTTEMENT*

Sets the friction coefficient for the formulation selected. Note: the unit and the value of this coefficient are dependent on the friction formula used.

Associated keyword: *LAW OF BOTTOM FRICTION*

FRICTION DATA

Type: Logical
Dimension: 1
Default value: NO
French keyword: *DONNEES POUR LE FROTTEMENT*

Enables to have a space-dependent choice of friction law, according to zones defined in the “FRICTION DATA FILE”

Associated keyword: *FRICTION DATA FILE*

FRICTION DATA FILE

Type: Character
Dimension: 1
Default value: none
French keyword: *FICHIER DE DONNEES POUR LE FROTTEMENT*

File containing the friction data setting the friction laws, coefficients, etc., in every zone, refer to the user manual for a list of data and format.

Associated keyword: *FRICTION DATA*

GEOMETRY FILE

Type: Character
Dimension: 1
Default value: none
French keyword: *FICHIER DE GEOMETRIE*

Name of file containing the mesh of the computation to be carried out.

Associated keyword: *GEOMETRY FILE FORMAT*

GEOMETRY FILE FORMAT

Type: Character
Dimension: 1
Default value: SERAFIN
French keyword: *FORMAT DU FICHIER DE GEOMETRIE*

Geometry file format. Possible values are:

SERAFIN : classical single precision format in Telemac,

SERAFIND : classical double precision format in Telemac,

MED : MED format based on HDF5

GRAPHIC PRINTOUT PERIOD

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE POUR LES SORTIES GRAPHIQUES*

Determines the period, in number of time steps, taken to print *VARIABLES FOR GRAPHIC PRINTOUTS* in the *RESULTS FILE.*

Associated keywords:	*RESULTS FILE* *NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS* *VARIABLES FOR GRAPHIC PRINTOUTS*

GRAVITY ACCELERATION

Type:	Real
Dimension:	1
Default value:	9.81
French keyword:	*ACCELERATION DE LA PESANTEUR*

Sets the gravity acceleration value in $m.s^{-2}$.

H CLIPPING

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*CLIPPING DE H*

Determines whether limiting the water depth H by a lower value is desirable or not. (for instance in the case of tidal flats). This key-word may have an influence on mass conservation since the truncation of depth is equivalent to adding mass. The lower value is specified *by MINIMUM VALUE OF DEPTH* (default : 0)

Associated keywords:	*MINIMUM VALUE OF DEPTH*

IDENTIFICATION METHOD

Type:	Integer
Dimension:	4
Default value:	1
French keyword:	*METHODE D'IDENTIFICATION*

Gives the technique used for minimising the cost function in parameter estimation. 1 is gradient, 2 is conjugate gradient, 3 is Lagrange interpolation. 0 is used for performing a list of tests with prescribed values of friction, to enable resorting to techniques which do not require an adjoint system. The sets of friction coefficients for every zone are given in file "FORMATTED DATA FILE 1" with a first line of comments and then for every line in free format:

Iteration number friction coefficients for every zone

The result for every test is given in the "FORMATTED RESULTS FILE". This file can be read by Rubens by selecting format SCOPT

Associated keywords:	*COST FUNCTION*
	MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION
	PARAMETER ESTIMATION
	TOLERANCES FOR IDENTIFICATION

IMPLICITATION COEFFICIENT OF TRACERS

Type:	Real
Dimension:	1
Default value:	0.6
French keyword:	*COEFFICIENT D'IMPLICITATION DES TRACEURS*

Sets the value of the implicitation coefficient of advection and diffusion terms in the tracer transport equation.

IMPLICITATION FOR DEPTH

Type:	Real
Dimension:	1
Default value:	0.55
French keyword:	*IMPLICITATION POUR LA HAUTEUR*

Sets the value of the implicitation coefficient for depth in the propagation step. A value below 0.5 leads to on unstable scheme.

IMPLICITATION FOR DIFFUSION OF VELOCITY

Type:	Real
Dimension:	1
Default value:	1.0
French keyword:	*IMPLICITATION POUR LA DIFFUSION DES VITESSES*

Should normally be set to 1 (fully implicit), however when solving the wave equation (see key-word TREATMENT OF THE LINEAR SYSTEM), the implicitation is applied only to the diagonal terms of the diffusion matrix. This is more stable but has the drawback that diagonal and off-diagonal terms are not taken at the same time, so one may want to choose an explicit form (value 0).

IMPLICITATION FOR VELOCITY

Type:	Real
Dimension:	1
Default value:	0.55
French keyword:	*IMPLICITATION POUR LA VITESSE*

Sets the value of the implicitation coefficient for velocity in the propagation step. Values below 0.5 result in an unstable condition.

INFORMATION ABOUT K-EPSILON MODEL

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*INFORMATIONS SUR LE MODELE K-EPSILON*

In the listing printout, this gives the number of solver iterations required for convergence in the diffusion and source terms step of the k and ε transport equations.

Associated keywords:	*LISTING PRINTOUT*
	LISTING PRINTOUT PERIOD
	NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS

INFORMATION ABOUT SOLVER

Type: Logical
Dimension: 1
Default value: YES
French keyword: *INFORMATIONS SUR LE SOLVEUR*

In the listing printout, this gives the number of iterations required for convergence of the propagation step solver.

Associated keywords: *LISTING PRINTOUT*
LISTING PRINTOUT PERIOD
NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS

INITIAL CONDITIONS

Type: Character
Dimension: 1
Default value: 'ZERO ELEVATION'
French keyword: *CONDITIONS INITIALES*

This is used to define initial water depth conditions. The following options are possible:

- 'ZERO ELEVATION' Initialises the free surface elevation to 0. The initial water depths are thus calculated from the difference between the free surface elevation and the bottom.
- 'CONSTANT ELEVATION' Initialises the free surface elevation to the value defined by the keyword 'INITIAL ELEVATION'. The initial water depths are computed as above.
- 'ZERO DEPTH' Initialises water depths to 0.
- 'CONSTANT DEPTH' Initialises water depths to the value defined by the keyword 'INITIAL DEPTH'.
- 'PARTICULAR' The initial water depth conditions must be specified in the subroutine `CONDIN`.

Associated keywords: *INITIAL ELEVATION*
INITIAL DEPTH

INITIAL DEPTH

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*HAUTEUR INITIALE*

Value of water depth imposed as initial state when the keyword *INITIAL CONDITIONS* is assigned the value 'CONSTANT DEPTH'.

Associated keyword:	*INITIAL CONDITIONS*

INITIAL ELEVATION

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*COTE INITIALE*

Value of free surface elevation imposed as initial state when the keyword *INITIAL CONDITIONS* is assigned the value 'CONSTANT ELEVATION'.

Associated keyword:	*INITIAL CONDITIONS*

INITIAL GUESS FOR H

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*ORDRE DU TIR INITIAL POUR H*

Initial guess for H for the propagation step solver.

Provides the option of modifying the initial value of ΔH (increment in water depth), for each iteration, in the propagation step using the values of this variable resulting from the previous time steps. This makes it possible to accelerate the convergence during resolution of this step. Three possibilities are available (ΔH_n being the variation of H between times t^{n-1} and t^n):

0: $\Delta H = 0.$
1: $\Delta H = \Delta H_n$ (final value of H at the previous time step)
2: $\Delta H = 2*\Delta H_n - \Delta H_{n-1}$ (extrapolation)

INITIAL GUESS FOR U

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*ORDRE DU TIR INITIAL POUR U*

Initial guess for the velocity components in the propagation step solver.

Provides the option of modifying the initial values of U and V, for each iteration, in the propagation step using the values of these variables resulting from the previous time steps. This makes it possible to accelerate the convergence during resolution of this step. Three possibilities are available:

0: U =0 / V = 0
1: U = U_n / V = V_n (final value of U and V at the previous time step)
2: U = $2U_n$ - U_{n-1} / V = $2V_n$ - V_{n-1} (extrapolation)

INITIAL TIME SET TO ZERO

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*REMISE A ZERO DU TEMPS*

Re-initialises the time to zero in the case of continuation of a previous computation.

Associated keyword:	*COMPUTATION CONTINUED*
	PREVIOUS COMPUTATION FILE

INITIAL VALUES OF TRACERS

Type:	Real
Dimension:	1
Default value:	variable
French keyword:	*VALEURS INITIALES DES TRACEURS*

Sets the initial value of the tracer. The user must specify one particular value for each tracer.

LANGUAGE

Type:	Integer
Dimension:	1

Default value: 2
French keyword: *LANGUE*

The following languages are available :

1 : FRENCH
2 : ENGLISH

LATITUDE OF ORIGIN POINT

Type: Real
Dimension: 1
Default value: 48.
French keyword: *LATITUDE DU POINT ORIGINE*

Sets the origin used to compute latitudes when a computation is carried out using spherical coordinates.

Associated keyword: *SPHERICAL COORDINATES*

LAW OF BOTTOM FRICTION

Type: Integer
Dimension: 1
Default value: 0
French keyword: *LOI DE FROTTEMENT SUR LE FOND*

Sets the formulation used to calculate bottom friction. The following options are possible:

0 : No bottom friction,
1 : Haaland formula (linear friction law),
2 : Chézy formula,
3 : Strickler formula,
4 : Manning formula,
5 : Nikuradse formula.
6 :
7 : Colebrooke-White formula

Associated keyword: *FRICTION COEFFICIENT*
MANNING DEFAULT VALUE FOR COLEBROOK-WHITE LAW

LIMIT VALUES

Type:	Real
Dimension:	8
Default value:	See below
French keyword:	*VALEURS LIMITES*

During a computation, it is possible to detect any divergence problem by prescribing values which must not be exceeded by dependent variables (H,U,V and T). This control function is activated using the logical keyword *CONTROL OF LIMITS.* The keyword *LIMIT VALUES* is used to fix the limit values of the different variables.

The eight values of this keyword are as follows:

- H lower limit
- H upper limit
- U lower limit
- U upper limit
- V lower limit
- V upper limit
- T lower limit (all tracers)
- T upper limit (all tracers)

All default values are -1000. for lower limits and +1000. for upper limits, except for depth, for which the upper limit is +9000.

Associated keyword: *CONTROL OF LIMITS*

LINEARIZED PROPAGATION

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*PROPAGATION LINEARISEE*

Used to linearize the propagation step, for example whilst carrying out test cases for which an analytical solution is available in the linearized case.

Associated keyword: *MEAN DEPTH FOR LINEARIZATION*

LIQUID BOUNDARIES FILE

Type:	Character
Dimension:	1
Default value:	None
French keyword:	*FICHIER DES FRONTIERES LIQUIDES*

Name of the file containing the prescribed values for liquid boundaries.

LIST OF POINTS

Type:	Integer
Dimension:	Variable
Default value:	none
French keyword:	*LISTE DE POINTS*

Specify the number of points used when giving a name on a point. The name is given by the keyword *NAMES OF POINTS*.

Associated keyword:	*NAMES OF POINTS*

LISTING PRINTOUT

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*SORTIE LISTING*

This parameter manages the results printout. If NO is entered, the listing will contain only the heading and the words NORMAL END OF PROGRAM. Also, the options *MASS-BALANCE, VALIDATION, VARIABLES TO BE PRINTED* are not considered.

De-activating this logical keyword should be avoided.

LISTING PRINTOUT PERIOD

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE DE SORTIE LISTING*

Sets the period, in number of time steps, taken to print information on the listing printout. The type of information depends on the keyword values used to configure the listing printouts.

Associated keywords:	*LISTING PRINTOUT* *NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS*

LONGITUDE OF ORIGIN POINT

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*LONGITUDE DU POINT ORIGINE*

Sets the origin used to compute longitudes when a computation is carried out using tide generating force.

Associated keyword:	*TIDE GENERATING FORCE*

MANNING DEFAULT VALUE FOR COLEBROOK-WHITE LAW

Type:	Real
Dimension:	1
Default value:	0.02
French keyword:	*VALEUR PAR DEFAUT DU MANNING POUR LA LOI DE COLEBROOK-WHITE*

This coefficient will be taken when the Colebrook-White law is used without friction data.

Associated keyword:	*FRICTION DATA*

MASS-BALANCE

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*BILAN DE MASSE*

Determines whether or not the mass-balance over the entire domain is checked. For each time step, this procedure computes the following:

- Flows at the inlets and outlets of the domain,
- Total flow through all boundaries of the domain (i.e. liquid or solid boundaries),
- The relative error on mass-conservation for this time step.

The relative error on mass-conservation for the whole computation is printed at the end of the listing.

Associated keywords:	*LISTING PRINTOUT*
	LISTING PRINTOUT PERIOD
	NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS

MASS-LUMPING ON H

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*MASS-LUMPING SUR H*

TELEMAC-2D provides the option of mass-lumping on H. This entails condensing all or part of the matrix AM1 (H) (depending on the value of this coefficient) on its diagonal.

This technique is used to accelerate the computation and also to make it more stable. However, the solutions obtained are smoothed.

This parameter sets the level of mass-lumping carried out on H.

It is advisable to use this parameter only in difficult cases.

MASS-LUMPING ON VELOCITY

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*MASS-LUMPING SUR LA VITESSE*

TELEMAC-2D provides the option of mass-lumping on the velocity. This entails condensing all or part of the matrices AM2 (U) and AM3 (V) (depending on the value of this keyword) on their diagonals.

This technique is used to accelerate the computation and also to make it more stable. However, the solutions obtained are smoothed.

This parameter sets the level of mass-lumping carried out on velocity components.

MATRIX STORAGE

Type:	Integer
Dimension:	1
Default value:	3
French keyword:	*STOCKAGE DES MATRICES*

This keyword configures the type of matrix storage:
1 : classic method
3 : edge-based storage

It is strongly recommended to use the default value.

MATRIX-VECTOR PRODUCT

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PRODUIT MATRICE-VECTEUR*

This keyword configures the type of matrix-vector multiplication:

1 : clasic matrix product

2 : frontal product with assembled matrix (necessitates a special numbering of nodes)

It is strongly recommended to use the default value.

MAXIMUM NUMBER OF FRICTION DOMAINS

Type:	Integer

Dimension: 1
Default value: 10
French keyword: *NOMBRE MAXIMUM DE DOMAINES DE FROTTEMENT*

To allocate arrays containing friction data. May be increased if necessary.

MAXIMUM NUMBER OF ITERATIONS FOR DIFFUSION OF TRACERS

Type: Integer
Dimension: 1
Default value: 60
French keyword: *MAXIMUM D'ITERATIONS POUR LA DIFFUSION DES TRACEURS*

At each time step, limits the number of solver iterations for computing tracer diffusion.

MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION

Type: Integer
Dimension: 1
Default value: 20
French keyword: *MAXIMUM D'ITERATIONS POUR L'IDENTIFICATION*

Gives the maximum number of iterations for the method chosen for parameter estimation.

Associated keywords: *COST FUNCTION*
IDENTIFICATION METHOD
PARAMETER ESTIMATION
TOLERANCES FOR IDENTIFICATION

MAXIMUM NUMBER OF ITERATIONS FOR K AND EPSILON

Type: Integer
Dimension: 1
Default value: 50
French keyword: *MAXIMUM D'ITERATIONS POUR K ET EPSILON*

At each time step, limits the number of solver iterations for computing diffusion and source/sink terms of the k-ε transport equations.

MAXIMUM NUMBER OF ITERATIONS FOR SOLVER

Type: Integer
Dimension: 1
Default value: 100
French keyword: *MAXIMUM D'ITERATIONS POUR LE SOLVEUR*

The algorithm used for solving the propagation step is iterative. The number of iterations is limited by this keyword.

Remark: a maximum number of 50 iterations per time step seems reasonable. When such a value is always exceeded within a simulation, it may be advisable to check the computational mesh and/or to reduce the time step.

MEAN DEPTH FOR LINEARIZATION

Type: Real
Dimension: 1
Default value: 0.
French keyword: *PROFONDEUR MOYENNE POUR LA LINEARISATION*

Sets the water depth around which linearization is carried out when the option *LINEARIZED PROPAGATION* is activated.

Associated keyword: *LINEARIZED PROPAGATION*

MEAN TEMPERATURE

Type: Real
Dimension: 1
Default value: 20.
French keyword: *TEMPERATURE MOYENNE*

If buoyancy effects due to horizontal density gradients are taken into account, this sets the reference temperature value used to compute the density.

Associated keywords: *DENSITY EFFECTS*

MINIMUM VALUE OF DEPTH

Type: Real
Dimension: 1
Default value: 0.
French keyword: *VALEUR MINIMUM DE H*

Gives the minimum value of depth when using H clipping.

Associated keywords: *H CLIPPING*

NAMES OF POINTS

Type:	Character
Dimension:	variable
Default value:	none
French keyword:	*NOMS DES POINTS*

Names of remarkable points for printouts.

Associated keyword: *LIST OF POINTS*

NAMES OF TRACERS

Type:	Character
Dimension:	variable
Default value:	none
French keyword:	*NOMS DES TRACEURS*

Name of tracers in 32 characters : 16 for the name, 16 for the unit.

NODES DISTANCES DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES DISTANCES ENTRE NOEUDS*

Results file for coupling with Delwaq

NON-DIMENSIONAL DISPERSION COEFFICIENTS

Type:	Real
Dimension:	2
Default value:	6.; 0.6
French keyword:	*COEFFICIENTS ADIMENSIONNELS DE DISPERSION*

For the Elder turbulence model, sets the dimensionless dispersion coefficients along directions parallel and perpendicular to the velocity.

Associated keyword: *TURBULENCE MODEL*

NON-SUBMERGED VEGETATION FRICTION

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*FROTTEMENT POUR LA VEGETATION NON SUBMERGEE*

Will trigger the computation of friction due to non submerged vegetation.

Associated keyword:	*DIAMETER OF ROUGHNESS ELEMENTS*
	SPACING OF ROUGHNESS ELEMENTS

NORTH

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*NORD*

Gives the angle (in degrees) between the geographical north and the Y axis (counted positively in the trigonometric direction). This information is used during computation of the Coriolis force.

Associated keyword:	*CORIOLIS*
	CORIOLIS COEFFICIENT

NUMBER OF CULVERTS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE SIPHONS*

Sets the number of culverts.

Associated keyword:	*FORMATTED DATA FILE 1*
	ABSCISSAE OF SOURCES
	ORDINATES OF SOURCES
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VELOCITIES OF SOURCES ALONG Y

NUMBER OF DROGUES

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE FLOTTEURS*

This parameter sets the number of drogues. In this case, the user must complete the `FLOT` subroutine where the following are given for each of the drogues:

- Release point coordinates,
- Release time,
- Tracking end time.

Times (last two variables) must be expressed as integers corresponding to the respective time step numbers. In this case, the user must also provide a binary file name different from the name of the results file, in order to store the trajectories. To do this, the keyword *BINARY RESULTS FILE* must be given a name in the steering file.

If a drogue leaves the domain through an open boundary, its tracking is of course interrupted, but the trajectory before reaching this outlet is available.

The results file for drogues is a Selafin format file. For the time being, awaiting developments in RUBENS, all the trajectories are stored there in the form of a pseudo-mesh. As with a classic mesh, it is therefore possible to display the node numbers corresponding to the positions of the drogues in the different time steps. Since node numbering increases over time, the user can form the relation between this and the times of the different drogue locations.

Another option regarding numbering has also been programmed, called *PRINTOUT PERIOD FOR DROGUES*. This integer, which is always positive and has the default value 1, corresponds to the

time step number between two consecutive drogue position printouts on file, i.e. between two consecutive numbers on each of the trajectories.

This is important for two reasons:

- to avoid having too large a drogue trajectory file,
- to make it easier to read the trajectory numbers.

This option does not affect accuracy during computation of the trajectories. It only affects discretization of the results.

Associated keyword: *PRINTOUT PERIOD FOR DROGUES*

NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS

Type: Integer
Dimension: 1
Default value: 0
French keyword: *NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES GRAPHIQUES*

Sets the number of the first time step for which the results are written into the file specified by the keyword: *RESULTS FILE* .

Associated keywords: *RESULTS FILE*
GRAPHIC PRINTOUT PERIOD
VARIABLES FOR GRAPHIC PRINTOUTS

NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS

Type: Integer
Dimension: 1
Default value: 0
French keyword: *NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES LISTING*

Sets the number of the first time step for which the results are written in the listing printouts.

Associated keywords: *LISTING PRINTOUT*
LISTING PRINTOUT PERIOD

NUMBER OF LAGRANGIAN DRIFTS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE DERIVES LAGRANGIENNES*

This is used to carry out several Lagrangian drift computations simultaneously in all the nodes of the mesh, during part or all of the computation. It is essential to fill in the `LAGRAN` subroutine where the following are given for each of the drift computations:

- computation start time,
- computation stop time.

As is the case with drogues, these two times must be expressed as whole numbers corresponding to the respective time steps.

With the keyword *VARIABLES FOR GRAPHIC PRINTOUTS*, the user must also associate the letters A and G, which on the results file correspond to the printouts of the X and Y movements associated with different drifts.

The algorithm computing these drifts is similar to the one applied for tracking drogues. The difference between these two options in fact lies simply in the type of information restored to the user. In the case of drift, the path taken is not conserved; only the resulting movement is given. On the other hand, this is available in all the nodes of the mesh.

To prove the similarity between these two options, simply release a drogue into a node of the mesh at the same time as starting a drift computation, then also interrupt the two computations at the same time. Then check that the displacement vector from this node is pointing towards the extremity of the drogue's trajectory.

If a drift leaves the domain through an open boundary for one of the nodes, the computation of drift on this node will of course be interrupted. Since only the resulting movement is of interest here, but is no longer available, it will be forced to zero for this node.

The resulting movements, along X and Y, are integrated in the form of two real number tables in the results file, i.e. at each computation time step for which a printout is planned two records are reserved for these drifts. Under RUBENS, their English names are `drift_along_X` and `drift_along_Y`.

However, it is possible, indeed probable, that the time step planned for the end of a computation will not correspond to a time step of the results printout. It is also possible that several drift computations, starting and finishing in different time steps, will be found in the same computation. To take these aspects into account, the recordings at each time step are set down as follows:

- If, at the time step being considered, none of the drift computations is finished, the tables of drift variables in X and Y will contain 2 tables of 0,
- Otherwise, they contain the most recently completed drift movements.

This choice means taking the following precautions to avoid losing information on a drift:

- Two drifts cannot be completed in the same time step,
- Between two drift computation endings, the results must be saved.

NUMBER OF PRIVATE ARRAYS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE TABLEAUX PRIVES*

Gives the number of private arrays.

NUMBER OF SUB-ITERATIONS FOR NON-LINEARITIES

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*NOMBRE DE SOUS-ITERATIONS POUR LES NON-LINEARITES*

Used to update the velocity field during several sub-iterations in order to produce a semi-implicitation of the advective terms for a given time step. At the first sub-iteration, the velocity field of the previous time step is taken. For the subsequent iterations, the velocity field of the previous sub-iteration is used. This technique improves the solution of non-linear terms. This keyword is very important for mass-conservation with advection scheme 2.

Associated keyword: *TYPE OF ADVECTION*

NUMBER OF TIME STEPS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE PAS DE TEMPS*

Sets the number of time steps to be computed during the simulation.

Associated keywords: *TIME STEP*

NUMBER OF TRACERS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE TRACEURS*

Defines the number of tracers.

NUMBER OF WEIRS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*NOMBRE DE SEUILS*

Sets the number of weirs to be treated as linewise singularities.

Associated keywords: *FORMATTED DATA FILE 1*

OPTION FOR LIQUID BOUNDARIES

Type:	Integer
Dimension:	Number of liquid boundaries
Default value:	1
French keyword:	*OPTION POUR LES FRONTIERES LIQUIDES*

This keyword sets the numerical scheme applied to liquid boundaries. The possible choices are:

1: usual free or prescribed values

2: computation by the Thompson method (based on the method of characteristics).

The user must supply one integer value per liquid boundary.

OPTION FOR THE DIFFUSION OF TRACERS

Type :	Integer
Dimension :	1
Default value :	1
French keyword:	*OPTION POUR LA DIFFUSION DES TRACEURS*

This keyword sets the type of treatment for the diffusion term of the tracer transport equation. Available options are :

1. The diffusion term is written: $div\left(\nu\ \overrightarrow{grad}\ (T)\right)$
2. The diffusion term is written: $\frac{1}{h} div\left(h\nu\ \overrightarrow{grad}\ (T)\right)$

OPTION FOR THE DIFFUSION OF VELOCITIES

Type :	Integer
Dimension :	1
Default value :	1
French keyword:	*OPTION POUR LA DIFFUSION DES VITESSES*

This keyword sets the type of treatment for the diffusion term of the momentum equations. Available options are :

1. The diffusion term is written: $div\left(\nu\ \overrightarrow{grad}\ (U)\right)$
2. The diffusion term is written: $\frac{1}{h} div\left(h\nu\ \overrightarrow{grad}\ (U)\right)$

OPTION FOR THE SOLVER FOR K-EPSILON MODEL

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*OPTION DU SOLVEUR POUR LE MODELE K-EPSILON*

For the time being, this is only used with the GMRES method (solver 7) applied to k and ε transport equations. In this case, this parameter is the size of the Krylov space. A value between 2 and 7 is reasonable. If very long computations must be run, it is advisable to try to optimise this value.

Attention: this keyword requires more memory space.

Associated keyword: *SOLVER FOR K-EPSILON MODEL*

OPTION FOR THE TREATMENT OF TIDAL FLATS

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*OPTION DE TRAITEMENT DES BANCS DECOUVRANTS*

Used to specify the type of treatment for areas that are alternately submerged and exposed. 3 options are proposed:

1: Submerged/exposed areas are detected and the free surface gradient is corrected. The areas with negative water depths (and tracer concentrations) are smoothed in order to prevent wiggles from appearing.

2: Submerged/exposed areas are removed from the computation. The exposed elements are still part of the mesh, but all their contributions to the computations are overridden by a so-called “masking” table. The data structure and computations therefore formally remain the same. This option is not available if, in the mesh, a node belongs to more than 10 elements.

3: It is the same option as 1 (equations solved everywhere with correction on tidal flats). but a porosity is added on half-dry half-wet elements, to account for the fact that not all the element is filled with water. The definition of the quantity of water is thus changed. It is no longer the integral of depth over the domain, but the integral of depth multiplied by the porosity

ORDINATES OF SOURCES

Type:	Real
Dimension:	Table
Default value:	none
French keyword:	*ORDONNEES DES SOURCES*

Real numbers giving the ordinates of possible sources of flowrate and/or tracer in the domain (in metres).

Associated keywords:	*ABSCISSAE OF SOURCES*
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VELOCITIES OF SOURCES ALONG Y
	TRACER
	VALUES OF THE TRACERS AT THE SOURCES

ORIGIN COORDINATES

Type:	Real
Dimension:	2
Default value:	0;0
French keyword:	*COORDONNEES DE L'ORIGINE*

Value in metres, used to avoid large real numbers, added in Selafin format, but so far no other treatment

ORIGINAL DATE OF TIME

Type:	Integer
Dimension:	3
Default value:	0; 0; 0
French keyword:	*DATE DE L'ORIGINE DES TEMPS*

Sets the date of the time origin corresponding to the computation starting time. It also sets the initial time when the tide generating force is included in the momentum equations. Table of three integers: year (4 digits), month, day.

Associated keywords:	*ORIGINAL HOUR OF TIME*
	TIDE GENERATING FORCE

ORIGINAL HOUR OF TIME

Type:	Integer
Dimension:	3
Default value:	0;0;0
French keyword:	*HEURE DE L'ORIGINE DES TEMPS*

Sets the hour of the time origin corresponding to the computation starting time. It also sets the initial time when the tide generating force is included in the momentum equations. Table of three integers: hours (4 digits), minutes, seconds.

Associated keywords:	*ORIGINAL DATE OF TIME*
	TIDE GENERATING FORCE

OUTPUT OF INITIAL CONDITIONS

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*SORTIE DES CONDITIONS INITIALES*

If YES, output of initial conditions in the results

PARALLEL PROCESSORS

Type:	Integer
Dimension:	1
Default value:	0
French keyword:	*PROCESSEURS PARALLELES*

Specifies the number of separate parallel processors on which the computation will be launched. The default value 0 corresponds to a scalar computation. Value higher or equal to 1 means using the parallel version on the specified number of processors.

PARAMETER ESTIMATION

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*ESTIMATION DE PARAMETRE*

Gives the name of the parameter to be estimated. The possible value are FRICTION or FRICTION,STEADY.

Associated keywords:	*COST FUNCTION*
	IDENTIFICATION METHOD
	MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION
	TOLERANCES FOR IDENTIFICATION

PERIODE POUR LES SORTIES LISTING

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE POUR LES SORTIES LISTING*

Determines, in number of time steps, the printout period of the VARIABLES TO BE PRINTED. The results are systematically printed out on the listing file.

PRECONDITIONING

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*PRECONDITIONNEMENT*

This is used to precondition the system of equations to be solved at the end of the propagation step in order to accelerate convergence during the resolution. The following options are available:

0: no preconditioning
2: diagonal preconditioning
3: block-diagonal preconditioning
5: diagonal preconditioning with absolute value of the diagonal
7: Crout's preconditioning per element or segment
11: Gauss-Seidel's preconditioning per element or segment

Only prime numbers are therefore kept to denote the preconditioning operations. When several of them are to be performed concurrently, the product of relevant options shall be made. For the time being, in all cases, it is advisable to select a diagonal preconditioning (value 2).
Preconditioning 3 (block-diagonal) can be used only when solving the primitive equations.

PRECONDITIONING FOR DIFFUSION OF TRACERS

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*PRECONDITIONNEMENT POUR LA DIFFUSION DES TRACEURS*

Used to precondition the system relating to the diffusion of the tracer. The following options are available:

0: no preconditioning
2: diagonal preconditioning
5: diagonal preconditioning with absolute value of the diagonal
7: Crout's preconditioning per element or segment
11: Gauss-Seidel's preconditioning per element or segment

Only prime numbers are therefore kept to denote the preconditioning operations. When several of them are to be performed concurrently, the product of relevant options shall be made. For the time being, in all cases, it is advisable to select a diagonal preconditioning (value 2).

PRECONDITIONING FOR K-EPSILON MODEL

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*PRECONDITIONNEMENT POUR LE MODELE K-EPSILON*

Used to precondition the two transport equations of the k-ε model. The following options are available:

0: no preconditioning
2: diagonal preconditioning
3: bloc-diagonal preconditioning
5: diagonal preconditioning with absolute value of the diagonal
7: Crout's preconditioning per element or segment
11: Gauss-Seidel's preconditioning per element or segment

Only prime numbers are therefore kept to denote the preconditioning operations. When several of them are to be performed concurrently, the product of relevant options shall be made.'

Preconditioning 3 (block-diagonal) can be used only when solving the primitive equations.

For the time being, in all cases, it is advisable to select a diagonal preconditioning (value 2).

PRESCRIBED ELEVATIONS

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*COTES IMPOSEES*

Position of the free surface on open boundaries with prescribed elevations. See also the section devoted to boundary conditions.

PRESCRIBED FLOWRATES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*DEBITS IMPOSES*

Values used on open boundaries with prescribed flowrates. See also the section devoted to boundary conditions.

PRESCRIBED TRACERS VALUES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*VALEURS IMPOSEES DES TRACEURS*

Values used on open boundaries with prescribed tracer values. The user set first all tracers on first liquid boundary, then all tracer for the second boundary etc….For See also the section devoted to boundary conditions.

PRESCRIBED VELOCITIES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*VITESSES IMPOSEES*

Values used on open boundaries with prescribed velocities. See also the section devoted to boundary conditions.

PREVIOUS COMPUTATION FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DU CALCUL PRECEDENT*

Name of a file containing the results of a previous computation carried out on the same mesh and whose last recorded time step will provide the initial conditions for a computation continuation.

Associated keywords:	*COMPUTATION CONTINUED*
	INITIAL TIME SET TO ZERO
	PREVIOUS COMPUTATION RESULTS FILE FORMAT

PREVIOUS COMPUTATION FILE FORMAT

Type:	Character
Dimension:	1
Default value:	‘SERAFIN ‘
French keyword:	*FORMAT DU FICHIER DU CALCUL PRECEDENT*

Previous computation results file format.. Possible values are

SERAFIN : classical single precision format in Telemac
SERAFIND: classical double precision format in Telemac
MED : MED format based on HDF5

Associated keywords: *PREVIOUS COMPUTATION FILE*

PRINTING CUMULATED FLOWRATES

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*IMPRESSION DU CUMUL DES FLUX*

If yes, prints the cumulated flow rates through control sections. In that case, the flow across control sections are computed at each time step.

PRINTOUT PERIOD FOR DROGUES

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*PERIODE POUR LES SORTIES FLOTTEURS*

Sets the number of time steps between two consecutive printouts of drogue positions on file, i.e. two consecutive numbers on each trajectory.

This is important for two reasons:

- To avoid having too large a drogue trajectory file,
- To make it easier to read the trajectory numbers.

This option does not affect accuracy during trajectory computation. It only affects result discretization.

Associated keywords: *NUMBER OF DROGUES*

PROPAGATION

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*PROPAGATION*

Provides the option of taking account of velocity and water depth propagation.

Since diffusion is included in this step, it will also be omitted if the value NO is selected.

RECORD NUMBER IN WAVE FILE

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*NUMERO DE L'ENREGISTREMENT DANS LE FICHIER DE HOULE*

When computing wave currents, gives the number of the record to be read in the file containing the wave information.

Associated keywords: *WAVE DRIVEN CURRENTS*

REFERENCE FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE REFERENCE*

Gives the name if the file containing the reference results when validating a computation.

REFERENCE FILE FORMAT

Type:	Character
Dimension:	1
Default value:	'SERAFIN '
French keyword:	*FORMAT DU FICHIER DE REFERENCE*

Gives the format of the previous computation results. Possible values are:

SERAFIN	: classical single precision format in Telemac
SERAFIND	: classical double precision format in Telemac
MED	: MED format based on HDF5

RESULTS FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES RESULTATS*

Name of file into which the computation results are written, with the period given by the keyword *GRAPHIC PRINTOUT PERIOD*'.

Associated keywords:	*RESULTS FILE FORMAT*
	GRAPHIC PRINTOUT PERIOD
	NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS
	VARIABLES FOR GRAPHIC PRINTOUTS

RESULTS FILE FORMAT

Type: Character
Dimension: 1
Default value: 'SERAFIN '
French keyword: *FORMAT DU FICHIER DE RESULTATS*

Gives the format of the results file. Possible values are:

SERAFIN : classical single precision format in Telemac
SERAFIND : classical double precision format in Telemac
MED : MED format based on HDF5

Associated keyword: *RESULT FILE*

ROUGHNESS COEFFICIENT OF BOUNDARIES

Type: Real
Dimension: 1
Default value: 100.
French keyword: *COEFFICIENT DE RUGOSITE DES BORDS*

Sets the friction coefficient on solid boundaries when, using the k-ε turbulence model with a rough wall turbulent regime on the domain solid boundaries.

The value of this parameter depends on the turbulent regime selected (*keyword LAW OF BOTTOM FRICTION*).

Associated keyword: *LAW OF BOTTOM FRICTION*
TURBULENCE MODEL
TURBULENCE MODEL FOR SOLID BOUNDARIES

SALINITY DELWAQ FILE

Type: Character
Dimension: 1
Default value: none
French keyword: *FICHIER DELWAQ DE LA SALINITE*

Results file for coupling with Delwaq

Associated keyword: *SALINITY FOR DELWAQ*

SALINITY FOR DELWAQ

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*SALINITE POUR DELWAQ*

Triggers output of salinity for Delwaq.

Associated keyword: *SALINITY DELWAQ FILE*

SECTIONS INPUT FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES SECTIONS DE CONTROLE*

Name of the file containing information about control sections. The use of this file is mandatory when running in parallel mode

Associated keyword: *SECTIONS OUTPUT FILE*

SECTIONS OUTPUT FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DE SORTIE DES SECTIONS DE CONTROLE*

Name of the file containing the results about control sections. The use of this file is mandatory when running in parallel mode

Associated keyword: *SECTIONS INPUT FILE*

SISYPHE STEERING FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES PARAMETRES DE SISYPHE*

When performing a simulation with SISYPHE coupled with TELEMAC, this keyword supplies the name of the parameter file used by SISYPHE.

Associated keyword: *COUPLING PERIOD*
COUPLING WITH

SOLVER

Type:	Integer
Dimension:	1
Default value:	3
French keyword:	*SOLVEUR*

Used to select the solver used for the propagation step. All the methods currently proposed are derived from the conjugate gradient method. They are as follows:

1: Conjugate gradient
2: Conjugate residual
3: Conjugate gradient on normal equation
4: Minimum error
5: Squared conjugate gradient (not available)
6: BICGSTAB (biconjugate stabilized gradient)
7: GMRES (Generalised Minimum RESidual)
8 : Direct solver

With solver 7 (GMRES) also use the keyword *SOLVER OPTION* which is the size of the Krylov space.

Associated keyword:	*SOLVER OPTION*

SOLVER ACCURACY

Type:	Real
Dimension:	1
Default value:	1.E-4
French keyword:	*PRECISION DU SOLVEUR*

Sets the level of accuracy required for resolution of the propagation step.

SOLVER FOR DIFFUSION OF TRACERS

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*SOLVEUR POUR LA DIFFUSION DES TRACEURS*

The possible values are the same as for the keyword *SOLVER*, *i.e.*:

1: Conjugate gradient
2: Conjugate residual
3: Conjugate gradient on normal equation
4: Minimum error
5: Squared conjugate gradient (not available)
6: BICGSTAB (biconjugate stabilized gradient)
7: GMRES (Generalised Minimum RESidual)
8: Direct solver

With solver 7 (GMRES) also use the keyword *SOLVER OPTION FOR TRACERS DIFFUSION* which is the size of the Krylov space.

Associated keyword: *SOLVER OPTION FOR TRACERS DIFFUSION*

SOLVER FOR K-EPSILON MODEL

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*SOLVEUR POUR LE MODELE K-EPSILON*

Used to select the solver used for the k-ε model transport equations. The possible values are the same as for the keyword *SOLVER*, i.e.:

1: Conjugate gradient
2: Conjugate residual
3: Conjugate gradient on normal equation
4: Minimum error
5: Squared conjugate gradient (not available)
6: BICGSTAB (biconjugate stabilized gradient)
7: GMRES (Generalised Minimum RESidual)
8: Direct solver

With solver 7 (GMRES) also use the keyword *OPTION FOR THE SOLVER FOR K-EPSILON MODEL* which is the size of the Krylov space.

Associated keyword: *OPTION FOR THE SOLVER FOR K-EPSILON MODEL*

SOLVER OPTION

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*OPTION DU SOLVEUR*

For the time being, this is only used with the GMRES method (solver 7) applied to hydrodynamic equations. In this case, this parameter is the size of the Krylov space. A value between 2 and 7 is reasonable. If very long computations must be run, it is advisable to try to optimise this value.

Notice : a high value of this keyword requires more memory space.

Associated keyword: *SOLVER*

SOLVER OPTION FOR TRACERS DIFFUSION

Type:	Integer
Dimension:	1
Default value:	2
French keyword:	*OPTION DU SOLVEUR POUR LA DIFFUSION DES TRACEURS*

For the time being, this is only used with the GMRES method (solver 7) applied to the tracer transport equation. In this case, this parameter is the size of the Krylov space. A value between 2 and 7 is reasonable. If very long computations must be done, it is advisable to try to optimise this value.

Notice : a high value of this keyword requires more memory space.

Associated keyword: *SOLVER FOR DIFFUSION OF TRACERS*

SOURCES FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES SOURCES*

Name of file containing time-dependent information on sources.

SPACING OF ROUGHNESS ELEMENTS

Type:	Real
Dimension:	1
Default value:	0.14
French keyword:	*ESPACEMENT DES ELEMENTS DE FROTTEMENT*

When there is a non-submerged vegetation friction, gives the spacing between elements

Associated keyword:	*DIAMETER OF ROUGHNESS ELEMENTS* *NON-SUBMERGED VEGETATION FRICTION*

SPHERICAL COORDINATES

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*COORDONNEES SPHERIQUES*

Selection of spherical coordinates to carry out the computation (for large ocean domains).

Attention: this option is closely linked with the mesh, which must have been entered on a Mercator projection marine map. The keyword *LATITUDE OF ORIGIN POINT* corresponding in the mesh to the ordinate y = 0 must also be obtained from the map.

Associated keyword:	*LATITUDE OF ORIGIN POINT*

STAGE-DISCHARGE CURVES

Type:	Integer
Dimension:	Variable
Default value:	none
French keyword:	*COURBES DE TARAGE*

Specifies if a discharge-elevation curve must be used for a given boundary. The user must supply a value for each open boundary. The possible values are :

0 : No curve
1 ; Z(Q) – Elevation function of flowrate
2 : Q(Z) – Flowrate function of elevation

Associated keyword:	*STAGE-DISCHARGE CURVES FILE*

STAGE-DISCHARGE CURVES FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DES COURBES DE TARAGE*

Name of file containing stage-discharge curves.

Associated keyword: *STAGE-DISCHARGE CURVES*

STOP CRITERIA

Type:	Real
Dimension:	3
Default value:	1.E-4; 1.E-4; 1.E-4
French keyword:	*CRITERES D'ARRET*

Sets the minimum value below which the difference between two time steps is considered to be zero.

When the option *STOP IF A STEADY STATE IS REACHED* is activated, program execution is stopped when the results no longer vary between two time steps. The test concerns the absolute value of the differences between two time steps. Each criterion therefore has the dimension of the variable it is controlling.

The three values of the table are applied in order to the following variables:

- Velocities
- Depth
- Tracer

Attention: selection of the right criterion is left to the user. This option will, moreover, be inoperative in the event of fundamentally non-stationary flows, such as Karman vortices behind an obstacle for instance.

Associated keyword: *STOP IF A STEADY STATE IS REACHED*

STOP IF A STEADY STATE IS REACHED

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*ARRET SI UN ETAT PERMANENT EST ATTEINT*

Stops the computation if a steady state is reached. In this case, the stop criterion must be specified using the keyword *STOP CRITERIA*.

Associated keyword: *STOP CRITERIA*

SUPG OPTION

Type:	Integer
Dimension:	4
Default value:	2;2;2;2
French keyword:	*OPTION DE SUPG*

Gives the type of upwinding used when using the SUPG method. The following values are possible:

0: No upwinding
1: Upwinding equals 1 (upwinding using the classic SUPG method)
2: Upwinding is equal to the Courant number (modified SUPG method)

In principle, option 2 is recommended for simulation with Courant number less than 1. If Courant number cannot be estimated or grether than 1, it is preferable to use option 1.

The four integer values are applied respectively (as with the keyword *TYPE OF ADVECTION*) to velocity, depth, the tracer and the k-ε model. However, this keyword has not yet been set up for the k-ε model.

Associated keywords: *TYPE OF ADVECTION*

TEMPERATURE DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DE LA TEMPERATURE*

Results file for coupling with Delwaq

Associated keywords: *TEMPERATURE FOR DELWAQ*

TEMPERATURE FOR DELWAQ

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*TEMPERATURE POUR DELWAQ*

Triggers output of temperature for Delwaq.

Associated keywords: *TEMPERATURE DELWAQ FILE*

THRESHOLD DEPTH FOR WIND

Type:	Real
Dimension:	1
Default value:	1.
French keyword:	*PROFONDEUR LIMITE POUR LE VENT*

Wind may trigger unphysical velocities on shallow waters, it is not applied when the depth is below this threshold.

THRESHOLD FOR NEGATIVE DEPTHS

Type:	Real
Dimension:	1
Default value:	0.
French keyword:	*SEUIL POUR LES PROFONDEURS NEGATIVES*

Below the threshold the negative depths are smoothed.

TIDAL FLATS

Type:	Logical
Dimension:	1
Default value:	YES
French keyword:	*BANCS DECOUVRANTS*

If NO is entered, the specific treatments for tidal flats are omitted, which reduces the computation time. In this case, ensure that there will not be zero height!

Associated keyword: *OPTION FOR THE TREATMENT OF TIDAL FLATS*

TIDE GENERATING FORCE

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*FORCE GENERATRICE DE LA MAREE*

Logical keyword for taking into account or ignoring the tide generating force.

Associated keyword:	*LONGITUDE OF ORIGIN POINT*
	ORIGINAL DATE OF TIME
	ORIGINAL HOUR OF TIME

TIME RANGE FOR FOURIER ANALYSIS

Type:	Real
Dimension:	2
Default value:	0.; 0.
French keyword:	*BORNES EN TEMPS POUR L'ANALYSE DE FOURIER*

For computing tidal range and phase of tide, gives the starting time and the ending time.

TIME STEP

Type:	Real
Dimension:	1
Default value:	1.
French keyword:	*PAS DE TEMPS*

Sets the time step in seconds.

Remark: To obtain a high level of precision, it is advisable to select the time step such that the propagation Courant number is low (2 or 3).

Associated keyword:	*DURATION*
	NUMBER OF TIME STEPS

TIME STEP REDUCTION FOR K-EPSILON MODEL

Type:	Real
Dimension:	1
Default value:	1
French keyword:	*REDUCTION DU PAS DE TEMPS POUR LE MODELE K-EPSILON*

Time step reduction coefficient for k-epsilon model

Remark: it is normally the same as that of the hydrodynamic system. Not recommended for use.

TITLE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*TITRE*

Title of the case being studied.

TOLERANCES FOR IDENTIFICATION

Type:	Real
Dimension:	4
Default value:	1.E-3; 1.E-3; 1.E-3; 1.E-4
French keyword:	*PRECISIONS POUR L'IDENTIFICATION*

The 4 values concerns:

1) the absolute precision on depth
2) the absolute precision on velocity u
3) the absolute precision on velocity v
4) the relative precision on the cost function

Iterations are stopped when all absolute precisions are reached OR when the relative precision on the cost function is reached.

Associated keywords:	*COST FUNCTION*
	IDENTIFICATION METHOD
	MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION
	PARAMETER ESTIMATION

TREATMENT OF NEGATIVE DEPTHS

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*TRAITEMENT DES HAUTEURS NEGATIVES*

In case of tidal flats, specifies the type of treatment of the negative depths. The possible values are :

0 : no treatment
1 : smoothing of negative depth
2 : Flux control

TREATMENT OF THE LINEAR SYSTEM

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*TRAITEMENT DU SYSTEME LINEAIRE*

Specify the treatment for Saint-Venant equations:

1 : Classical option. Shallow Water equations are treated in their primitive form. Depth and velocity are coupled in the final linear system.

2 : Wave equation. The momentum equation is used to eliminate the velocity in the continuity equation.

Option 2 is faster in many cases and is recommended.

TURBULENCE MODEL

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*MODELE DE TURBULENCE*

Four choices are currently possible:

1: Constant viscosity
2 : Elder model
3: k-ε model
4 : Smagorinski model

Attention: if option 1 is selected, do not forget to enter the viscosity value using the keyword *VELOCITY DIFFUSIVITY*.

If option 2 is selected, longitudinal and cross-dispersions must be specified with the keyword *NON-DIMENSIONAL DISPERSION COEFFICIENTS*.

If option 3 or 4 is selected, the keyword *VELOCITY DIFFUSIVITY* must be the value of molecular viscosity (10^{-6} m^2/s) because it is used as such in the turbulence model.

Associated keyword:	*VELOCITY DIFFUSIVITY*
	NON-DIMENSIONAL DISPERSION COEFFICIENTS

TURBULENCE MODEL FOR SOLID BOUNDARIES

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*REGIME DE TURBULENCE POUR LES PAROIS*

Used to select the turbulence model for solid boundaries, whilst using the k-ε model.

1: Smooth wall
2: Rough wall

Associated keyword:	*ROUGHNESS COEFFICIENT OF BOUNDARIES*

TYPE OF ADVECTION

Type:	Integer
Dimension:	4
Default value:	1;5;1;1
French keyword:	*FORME DE LA CONVECTION*

This keyword is a table of 4 numbers specifying the method used to solve the advection step. The four values refer to:

1) U and V (velocity components)
2) H (celerity or water depth)
3) T (tracer)
4) k and ε

If there is any uncertainty about the values to be specified, using the default configuration is recommended.

Selecting the type of advection gives access to schemes with widely varying properties for mass-conservation and numerical stability.

The following options are possible:

1:	Method of characteristics
2:	Centred semi-implicit scheme + SUPG upwinding
3:	Upwind explicit finite volumes
4:	N distributive scheme, mass-conservative
5:	PSI distributive scheme, mass-conservative (mandatory for H)
6 :	PSI scheme on non conservative equation
7 :	Implicit N scheme on non conservative equation
13:	Edge by edge implementation of scheme 3
14:	Edge by edge implementation of scheme 4

If there is neither tracer, nor k-ε model, it is sufficient to give only two numbers, for example: 1;5

3 and 4 are the same in 2D (not in 3D). 13 and 14 are the same in 2D (not in 3D)

Associated keyword:	*NUMBER OF SUB-ITERATIONS FOR NON-LINEARITIES*
	SUPG OPTION

TYPE OF SOURCES

Type:	Integer
Dimension:	1
Default value:	1
French keyword:	*TYPE DES SOURCES*

Specify the type of treatment for the sources. The first option is a finite element source, the second option is a Dirac function.

VALIDATION

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*VALIDATION*

Option used mainly for the validation file. The previous computation results file is thus considered to be a reference to which the computation is to be compared. The maximum deviation found between the two results for each time step is therefore written in the listing printouts.

The comparison is made by the `VALIDA` subroutine which may be modified to include, for example, a comparison with an exact solution.

Associated keywords:	*REFERENCE FILE*
	REFERENCE FILE FORMAT

VALUES OF THE TRACERS AT THE SOURCES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*VALEURS DES TRACEURS DES SOURCES*

Real numbers giving the values of the tracers at the sources.

Associated keywords:	*ABSCISSAE OF SOURCES*
	ORDINATES OF SOURCES
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VELOCITIES OF SOURCES ALONG Y

VARIABLE TIME-STEP

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*PAS DE TEMPS VARIABLE*

When this option is activated, the time-step is modified so that the maximum Courant number keeps below the value specified for the *keyword DESIRED COURANT NUMBER*.

Associated keyword:	*DESIRED COURANT NUMBER*

VARIABLES FOR GRAPHIC PRINTOUTS

Type:	Character
Dimension:	variable
Default value:	'U, V, H, B'
French keyword:	*VARIABLES POUR LES SORTIES GRAPHIQUES*

Names of the variables the user wishes to write into the results file. Each variable is represented by a letter. The delimiters may be chosen at will.

The following options are available:

- U: Velocity along x axis (m/s),
- V: Velocity along y axis (m/s),
- C: Water wave celerity (m/s),
- H: Water depth (m),
- S: Free surface elevation (m),
- B: Bottom elevation (m),
- F: Froude number,
- Q: Scalar flowrate of fluid (m^2/s),
- T*: Tracer number * (T1 means first tracer)
- K: Turbulent energy of k-ε model (J/kg),
- E: Dissipation of turbulent energy (W/kg),
- D: Turbulent viscosity of k-ε model (m^2/s),
- I: Flowrate along x axis (m^2/s),
- J: Flowrate along y axis (m^2/s),
- M: Scalar velocity (m/s),
- X: Wind along x axis (m/s),
- Y: Wind along y axis (m/s),

- P: Air pressure (Pa),
- W: Friction coefficient on the bottom,
- A: Drift along X (m),
- G: Drift along Y (m),
- L: Courant number,
- N: User variable,
- O: User variable,
- R: User variable,
- Z: User variable,
- MAXZ : will give the maximum elevation (high water mark)
- TMXZ : will give the time of high water mark.
- MAXV : maximum velocity (in norm).
- TMXV : time of maximum velocity.
- US : friction velocity

Jokers are accepted. For example, T* will stand for T followed by any character (ie. T1 to T9). T** will stand for T followed by 2 characters (ie. T10 to T99)

The user also has four free fields at his disposal, which he may use to write variables that he creates himself in the results file. These user variables must be computed in the `PRERES` subroutine, and the names to be assigned to them must be defined in the `NOMVAR` subroutine. These four fields are N, O, R and Z corresponding to the tables `PRIVE`(1,1), `PRIVE`(1,2),`PRIVE`(1,3), `PRIVE`(1,4). Sufficient size must therefore be given to the `PRIVE` table (in the main program).

It is thus possible to limit, for example, the size of the results files for very large computations. However, it must be borne in mind that if a computation is continued, the code must have access to the information it requires to do so in the results file, i.e.:

- velocities U and V,
- water depths H,
- bottom elevations B.

Nevertheless, TELEMAC-2D can recompute some of these variables from other variables entered (for example, it will recompute H using S and B).

Associated keywords: *RESULTS FILE*
GRAPHIC PRINTOUT PERIOD
NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS

VARIABLES TO BE PRINTED

Type:	Character
Dimension:	1
Default value:	‘ ‘
French keyword:	*VARIABLES A IMPRIMER*

Name of the variables that the user wishes to write on the listing printout.
See keyword VARIABLES FOR GRAPHIC PRINTOUTS

Associated keywords:	*LISTING PRINTOUT*
	LISTING PRINTOUT PERIOD
	NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS

VELOCITIES OF THE SOURCES ALONG X

Type:	Real
Dimension:	Variable
Default value:	Computed velocities at source nodes
French keyword:	*VITESSES DES SOURCES SELON X*

Specifies the component of velocity at each source (m/s) along X.

Associated keywords:	*ABSCISSAE OF SOURCES*
	ORDINATES OF SOURCES
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG Y
	VALUES OF THE TRACERS AT THE SOURCES

VELOCITIES OF THE SOURCES ALONG Y

Type:	Real
Dimension:	Variable
Default value:	Computed velocities at source nodes
French keyword:	*VITESSES DES SOURCES SELON Y*

Specifies the component of velocity at each source (m/s) along Y.

Associated keywords:	*ABSCISSAE OF SOURCES*
	ORDINATES OF SOURCES
	WATER DISCHARGE OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VALUES OF THE TRACERS AT THE SOURCES

VELOCITY DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DE LA VITESSE*

Results file for coupling with Delwaq

Associated keywords:	*VELOCITY FOR DELWAQ*

VELOCITY DIFFUSIVITY

Type:	Real
Dimension:	1
Default value:	1.0E-4
French keyword:	*COEFFICIENT DE DIFFUSION DES VITESSES*

Sets the constant viscosity coefficient (molecular + turbulent). This value can have significant influence on the shape and size of recirculations and also model dispersion.

Associated keyword:	*TURBULENCE MODEL*

VELOCITY FOR DELWAQ

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*VITESSE POUR DELWAQ*

Triggers output of salinity for Delwaq.

Associated keywords: *VELOCITY DELWAQ FILE*

VELOCITY PROFILES

Type:	Integer
Dimension:	Variable
Default value:	1
French keyword:	*PROFILS DE VITESSE*

Defines velocity profiles on liquid boundaries:

1 : the velocity vector is perpendicular to the liquid boundary

2 : U and V are defined in the boundary conditions file (UBOR and VBOR values, columns 5 and 6)

3 : the velocity is perpendicular to the boundary and its norm is specified by the UBOR variable in the boundary conditions file.

4 : velocity normal to the boundary, and proportional to sqrt(h).

Associated keyword: *PRESCRIBED VELOCITIES*
PRESCRIBED FLOWRATES

VERTICAL FLUXES DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES FLUX VERTICAUX*

Results file for coupling with Delwaq.

VERTICAL STRUCTURES

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*STRUCTURES VERTICALES*

Drag forces from vertical structures are taken into account. Subroutine DRAGFO must then be implemented.

VOLUMES DELWAQ FILE

Type:	Character
Dimension:	1
Default value:	none
French keyword:	*FICHIER DELWAQ DES VOLUMES*

Results file for coupling with Delwaq.

WATER DENSITY

Type:	Real
Dimension:	1
Default value:	1020.
French keyword:	*MASSE VOLUMIQUE DE L'EAU*

Sets the water density value. Attention: the default value is that of sea water.

WATER DISCHARGE OF SOURCES

Type:	Real
Dimension:	Variable
Default value:	none
French keyword:	*DEBITS DES SOURCES*

Real numbers giving the flowrates at sources in m^3/s.

Associated keywords:	*ABSCISSAE OF SOURCES*
	ORDINATES OF SOURCES
	VELOCITIES OF SOURCES ALONG X
	VELOCITIES OF SOURCES ALONG Y
	VALUES OF THE TRACERS AT THE SOURCES

WAVE DRIVEN CURRENTS

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*COURANTS DE HOULE*

When set to yes, the wave driven currents are taken into account.

Associated keywords:	*RECORD NUMBER IN WAVE FILE*

WIND

Type:	Logical
Dimension:	1
Default value:	NO
French keyword:	*VENT*

The option of taking the effects of wind into account.

Associated keywords:	*WIND VELOCITY ALONG X*
	WIND VELOCITY ALONG Y

WIND VELOCITY ALONG X

Type:	Real
Dimension:	1
Default value:	0.0
French keyword:	*VITESSE DU VENT SUIVANT X*

Component of wind velocity (m/s) along X.

Associated keywords:	*WIND*
	WIND VELOCITY ALONG Y

WIND VELOCITY ALONG Y

Type:	Real
Dimension:	1
Default value:	0.0
French keyword:	*VITESSE DU VENT SUIVANT Y*

Component of wind velocity (m/s) along Y.

Associated keywords:	*WIND*
	WIND VELOCITY ALONG X

2 LIST OF KEYWORDS CLASSIFIED ACCORDING TO TYPE

RESULTS AND LISTING

GRAPHIC PRINTOUT PERIOD
INFORMATION ABOUT K-EPSILON MODEL
INFORMATION ABOUT SOLVER
LISTING PRINTOUT
LISTING PRINTOUT PERIOD
MASS-BALANCE
NUMBER OF DROGUES
NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS
NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS
NUMBER OF LAGRANGIAN DRIFTS
OUTPUT OF INITIAL CONDITIONS
PRINTOUT PERIOD FOR DROGUES
VARIABLES FOR GRAPHIC PRINTOUTS
VARIABLES TO BE PRINTED

PHYSICAL PARAMETERS

AIR PRESSURE
COEFFICIENT OF WIND INFLUENCE
CORIOLIS COEFFICIENT
DIAMETER OF ROUGHNESS ELEMENTS
FRICTION COEFFICIENT
GRAVITY ACCELERATION
LATITUDE OF ORIGIN POINT
LONGITUDE OF ORIGIN POINT
MANNING DEFAULT VALUE FOR COLEBROOK-WHITE LAW
MEAN TEMPERATURE
NON-DIMENSIONAL DISPERSION COEFFICIENTS
NORTH
ROUGHNESS COEFFICIENT OF BOUNDARIES
SPACING OF ROUGHNESS ELEMENTS
VELOCITY DIFFUSIVITY
WATER DENSITY
WIND VELOCITY ALONG X

WIND VELOCITY ALONG Y

BOUNDARY AND INITIAL CONDITIONS, MANAGEMENT OF TIME

COMPUTATION CONTINUED
DURATION
INITIAL CONDITIONS
INITIAL DEPTH
INITIAL ELEVATION
INITIAL TIME SET TO ZERO
NUMBER OF TIME STEPS
OPTION FOR LIQUID BOUNDARIES
ORIGINAL DATE OF TIME
ORIGINAL HOUR OF TIME
PRESCRIBED ELEVATIONS
PRESCRIBED FLOWRATES
PRESCRIBED VELOCITIES
STAGE-DISCHARGE CURVES
TIME STEP
TIME STEP REDUCTION FOR K-EPSILON MODEL
VELOCITY PROFILES

INPUTS-OUTPUTS

BINARY DATA FILE 1
BINARY DATA FILE 2
BINARY RESULTS FILE
BOTTOM TOPOGRAPHY FILE
BOUNDARY CONDITIONS FILE
FORMATTED DATA FILE 1
FORMATTED DATA FILE 2
FORMATTED RESULTS FILE
FORTRAN FILE
FRICTION DATA FILE
GEOMETRY FILE
GEOMETRY FILE FORMAT
LIQUID BOUNDARIES FILE
PREVIOUS COMPUTATION FILE
PREVIOUS COMPUTATION FILE FORMAT
REFERENCE FILE

REFERENCE FILE FORMAT
RESULTS FILE
RESULTS FILE FORMAT
SOURCE FILE
STAGE-DISCHARGE CURVES FILE

NUMERICAL SCHEME, EQUATIONS, SOURCE TERMS

ABSCISSAE OF SOURCES
ADVECTION
ADVECTION OF H
ADVECTION OF K AND EPSILON
ADVECTION OF U AND V
BOTTOM SMOOTHINGS
CORIOLIS
DENSITY EFFECTS
DEPTH IN FRICTION TERMS
DESIRED COURANT NUMBER
DIFFUSION OF VELOCITY
DISCRETIZATIONS IN SPACE
EQUATIONS
FINITE VOLUME SCHEME
FREE SURFACE GRADIENT COMPATIBILITY
FRICTION DATA
H CLIPPING
IMPLICITATION FOR DEPTH
IMPLICITATION FOR DIFFUSION OF VELOCITY
IMPLICITATION FOR VELOCITY
LAW OF BOTTOM FRICTION
LINEARIZED PROPAGATION
MASS-LUMPING ON H
MASS-LUMPING ON VELOCITY
MATRIX STORAGE
MATRIX-VECTOR PRODUCT
MAXIMUM NUMBER OF FRICTION DOMAINS
MEAN DEPTH FOR LINEARIZATION
MINIMUM VALUE OF DEPTH
NON-SUBMERGED VEGETATION FRICTION
NUMBER OF SUB-ITERATIONS FOR NON-LINEARITIES
OPTION FOR THE DIFFUSION OF VELOCITIES
OPTION FOR THE TREATMENT OF TIDAL FLATS
ORDINATES OF SOURCES

PROPAGATION
RECORD NUMBER IN WAVE FILE
SPHERICAL COORDINATES
SUPG OPTION
THRESHOLD DEPTH FOR WIND
THRESHOLD FOR NEGATIVE DEPTHS
TIDAL FLATS
TIDE GENERATING FORCE
TREATMENT OF NEGATIVE DEPTHS
TREATMENT OF THE LINEAR SYSTEM
TURBULENCE MODEL
TURBULENCE MODEL FOR SOLID BOUNDARIES
TYPE OF ADVECTION
TYPE OF SOURCES
VARIABLE TIME-STEP
VELOCITIES OF THE SOURCES ALONG X
VELOCITIES OF THE SOURCES ALONG Y
VERTICAL STRUCTURES
WATER DISCHARGE OF SOURCES
WAVE DRIVEN CURRENTS
WIND

ACCURACY AND SOLVERS

ACCURACY OF EPSILON
ACCURACY OF K
CONTINUITY CORRECTION
C-U PRECONDITIONING
INITIAL GUESS FOR H
INITIAL GUESS FOR U
MAXIMUM NUMBER OF ITERATIONS FOR K AND EPSILON
MAXIMUM NUMBER OF ITERATIONS FOR SOLVER
OPTION FOR THE SOLVER FOR K-EPSILON MODEL
PRECONDITIONING
PRECONDITIONING FOR K-EPSILON MODEL
SOLVER
SOLVER ACCURACY
SOLVER FOR K-EPSILON MODEL
SOLVER OPTION

PARAMETER ESTIMATION

COST FUNCTION
IDENTIFICATION METHOD
MAXIMUM NUMBER IF ITERATIONS FOR IDENTIFICATION
PARAMETER ESTIMATION
TOLERANCES FOR IDENTIFICATION

TRACER

ACCURACY FOR DIFFUSION OF TRACERS
ADVECTION OF TRACERS
COEFFICIENT FOR DIFFUSION OF TRACERS
DIFFUSION OF TRACERS
IMPLICITATION COEFFICIENT OF TRACERS
INITIAL VALUES OF TRACERS
MAXIMUM NUMBER OF ITERATIONS FOR DIFFUSION OF TRACERS
NAMES OF TRACERS
NUMBER OF TRACERS
OPTION FOR THE DIFFUSION OF TRACERS
PRECONDITIONING FOR DIFFUSION OF TRACERS
PRESCRIBED TRACERS VALUES
SOLVER FOR DIFFUSION OF TRACERS
SOLVER OPTION FOR TRACERS DIFFUSION
VALUES OF THE TRACERS AT THE SOURCES

DELWAQ

BOTTOM SURFACES DELWAQ FILE
DELWAQ PRINTOUT PERIOD
DELWAQ STEERING FILE
DIFFUSIVITY DELWAQ FILE
DIFFUSIVITY FOR DELWAQ
EXCHANGE AREAS DELWAQ FILE
EXCHANGE BETWEEN NODES DELWAQ FILE
NODES DISTANCES DELWAQ FILE
SALINITY DELWAQ FILE
SALINITY FOR DELWAQ
TEMPERATURE DELWAQ FILE
TEMPERATURE FOR DELWAQ
VELOCITY DELWAQ FILE
VELOCITY FOR DELWAQ

VERTICAL FLUXES DELWAQ FILE
VOLUMES DELWAQ FILE

CONTROL SECTIONS

COMPATIBLE COMPUTATION OF FLUXES
PRINTING CUMULATED FLOWRATE
SECTIONS INPUT FILE
SECTIONS OUTPUT FILE

MISCELLANEOUS

CONTROL OF LIMITS
CONTROL SECTIONS
COUPLING PERIOD
COUPLING WITH
DEBUGGER
DEFINITION OF ZONES
ELEMENTS MASKED BY USER
FOURIER ANALYSIS PERIOD
LANGUAGE
LIMIT VALUES
LIST OF POINTS
NAMES OF POINTS
NUMBER OF CULVERTS
NUMBER OF PRIVATE ARRAYS
NUMBER OF WEIRS
ORIGIN COORDINATES
PARALLEL PROCESSORS
SISYPHE STEERING FILE
STOP CRITERIA
STOP IF A STEADY STATE IS REACHED
TIME RANGE FOR FOURIER ANALYSIS
TITLE
VALIDATION

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3 ENGLISH/FRENCH GLOSSARY OF KEYWORDS

ABSCISSAE OF SOURCES	ABSCISSES DES SOURCES
ACCURACY FOR DIFFUSION OF TRACERS	PRECISION POUR LA DIFFUSION DES TRACEURS
ACCURACY OF EPSILON	PRECISION SUR EPSILON
ACCURACY OF K	PRECISION SUR K
ADVECTION	CONVECTION
ADVECTION OF H	CONVECTION DE H
ADVECTION OF K AND EPSILON	CONVECTION DE K ET EPSILON
ADVECTION OF TRACERS	CONVECTION DES TRACEURS
ADVECTION OF U AND V	CONVECTION DE U ET V
AIR PRESSURE	PRESSION ATMOSPHERIQUE
BINARY DATA FILE 1	FICHIER DE DONNEES BINAIRE 1
BINARY DATA FILE 2	FICHIER DE DONNEES BINAIRE 2
BINARY RESULTS FILE	FICHIER DE RESULTATS BINAIRE
BOTTOM SMOOTHINGS	LISSAGES DU FOND
BOTTOM SURFACES DELWAQ FILE	FICHIER DELWAQ DES SURFACES DU FOND
BOTTOM TOPOGRAPHY FILE	FICHIER DES FONDS
BOUNDARY CONDITIONS FILE	FICHIER DES CONDITIONS AUX LIMITES
COEFFICIENT FOR DIFFUSION OF TRACERS	COEFFICIENT DE DIFFUSION DES TRACEURS
COEFFICIENT OF WIND INFLUENCE	COEFFICIENT D'INFLUENCE DU VENT
COMPATIBLE COMPUTATION OF FLUXES	CALCUL COMPATIBLE DES FLUX
COMPUTATION CONTINUED	SUITE DE CALCUL
CONTINUITY CORRECTION	CORRECTION DE CONTINUITE
CONTROL OF LIMITS	CONTROLE DES LIMITES
CONTROL SECTIONS	SECTIONS DE CONTROLE
CORIOLIS	CORIOLIS
CORIOLIS COEFFICIENT	COEFFICIENT DE CORIOLIS
COST FUNCTION	FONCTION COUT
COUPLING PERIOD	PERIODE DE COUPLAGE
COUPLING WITH	COUPLAGE AVEC
C-U PRECONDITIONING	PRECONDITIONNEMENT C-U
DEBUGGER	DEBUGGER
DEFINITION OF ZONES	DEFINITION DE ZONES
DELWAQ PRINTOUT PERIOD	PERIODE DE SORTIE POUR DELWAQ
DELWAQ STEERING FILE	FICHIER DE COMMANDE DELWAQ
DENSITY EFFECTS	EFFETS DE DENSITE
DEPTH IN FRICTION TERMS	HAUTEUR DANS LES TERMES DE FROTTEMENT
DESIRED COURANT NUMBER	NOMBRE DE COURANT SOUHAITE
DIAMETER OF ROUGHNESS ELEMENTS	DIAMETRE DES ELEMENTS DE FROTTEMENT
DIFFUSION OF TRACERS	DIFFUSION DES TRACEURS
DIFFUSION OF VELOCITY	DIFFUSION DES VITESSES
DIFFUSIVITY DELWAQ FILE	FICHIER DELWAQ DE LA DIFFUSION
DIFFUSIVITY FOR DELWAQ	DIFFUSION POUR DELWAQ
DISCRETIZATIONS IN SPACE	DISCRETISATIONS EN ESPACE
DURATION	DUREE DU CALCUL
ELEMENTS MASKED BY USER	ELEMENTS MASQUES PAR L'UTILISATEUR
EQUATIONS	EQUATIONS
EXCHANGE AREAS DELWAQ FILE	FICHIER DELWAQ DES SURFACES DE FLUX
EXCHANGES BETWEEN NODES DELWAQ FILE	FICHIER DELWAQ DES ECHANGES ENTRE NOEUDS
FINITE VOLUME SCHEME	SCHEMA EN VOLUMES FINIS
FORMATTED DATA FILE 1	FICHIER DE DONNEES FORMATE 1
FORMATTED DATA FILE 2	FICHIER DE DONNEES FORMATE 2
FORMATTED RESULTS FILE	FICHIER DE RESULTATS FORMATE
FORTRAN FILE	FICHIER FORTRAN
FOURIER ANALYSIS PERIODS	PERIODES D'ANALYSE DE FOURIER
FREE SURFACE GRADIENT COMPATIBILITY	COMPATIBILITE DU GRADIENT DE SURFACE LIBRE
FRICTION COEFFICIENT	COEFFICIENT DE FROTTEMENT
FRICTION DATA	DONNEES POUR LE FROTTEMENT
FRICTION DATA FILE	FICHIER DE DONNEES POUR LE FROTTEMENT
GEOMETRY FILE	FICHIER DE GEOMETRIE
GEOMETRY FILE FORMAT	FORMAT DU FICHIER DE GEOMETRIE
GRAPHIC PRINTOUT PERIOD	PERIODE POUR LES SORTIES GRAPHIQUES

GRAVITY ACCELERATION	ACCELERATION DE LA PESANTEUR
H CLIPPING	CLIPPING DE H
IDENTIFICATION METHOD	METHODE D'IDENTIFICATION
IMPLICITATION COEFFICIENT OF TRACERS	COEFFICIENT D'IMPLICITATION DES TRACEURS
IMPLICITATION FOR DEPTH	IMPLICITATION POUR LA HAUTEUR
IMPLICITATION FOR DIFFUSION OF VELOCITY	IMPLICITATION POUR LA DIFFUSION DES VITESSES
IMPLICITATION FOR VELOCITY	IMPLICITATION POUR LA VITESSE
INFORMATION ABOUT K-EPSILON MODEL	INFORMATIONS SUR LE MODELE K-EPSILON
INFORMATION ABOUT SOLVER	INFORMATIONS SUR LE SOLVEUR
INITIAL CONDITIONS	CONDITIONS INITIALES
INITIAL DEPTH	HAUTEUR INITIALE
INITIAL ELEVATION	COTE INITIALE
INITIAL GUESS FOR H	ORDRE DU TIR INITIAL POUR H
INITIAL GUESS FOR U	ORDRE DU TIR INITIAL POUR U
INITIAL TIME SET TO ZERO	REMISE A ZERO DU TEMPS
INITIAL VALUES OF TRACERS	VALEURS INITIALES DES TRACEURS
LANGUAGE	LANGUE
LATITUDE OF ORIGIN POINT	LATITUDE DU POINT ORIGINE
LAW OF BOTTOM FRICTION	LOI DE FROTTEMENT SUR LE FOND
LIMIT VALUES	VALEURS LIMITES
LINEARIZED PROPAGATION	PROPAGATION LINEARISEE
LIQUID BOUNDARIES FILE	FICHIER DES FRONTIERES LIQUIDES
LIST OF FILES	LISTE DES FICHIERS
LIST OF POINTS	LISTE DE POINTS
LISTING PRINTOUT	SORTIE LISTING
LISTING PRINTOUT PERIOD	PERIODE DE SORTIE LISTING
LONGITUDE OF ORIGIN POINT	LONGITUDE DU POINT ORIGINE
MANNING DEFAULT VALUE FOR COLEBROOK-WHITE LAW	VALEUR PAR DEFAUT DU MANNING POUR LA LOI DE COLEBROOK-WHITE
MASS-BALANCE	BILAN DE MASSE
MASS-LUMPING ON H	MASS-LUMPING SUR H
MASS-LUMPING ON VELOCITY	MASS-LUMPING SUR LA VITESSE
MATRIX STORAGE	STOCKAGE DES MATRICES
MATRIX-VECTOR PRODUCT	PRODUIT MATRICE-VECTEUR
MAXIMUM NUMBER OF FRICTION DOMAINS	NOMBRE MAXIMUM DE DOMAINES DE FROTTEMENT
MAXIMUM NUMBER OF ITERATIONS FOR DIFFUSION OF TRACERS	MAXIMUM D'ITERATIONS POUR LA DIFFUSION DES TRACEURS
MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION	MAXIMUM D'ITERATIONS POUR L'IDENTIFICATION
MAXIMUM NUMBER OF ITERATIONS FOR K AND EPSILON	MAXIMUM D'ITERATIONS POUR K ET EPSILON
MAXIMUM NUMBER OF ITERATIONS FOR SOLVER	MAXIMUM D'ITERATIONS POUR LE SOLVEUR
MEAN DEPTH FOR LINEARIZATION	PROFONDEUR MOYENNE POUR LA LINEARISATION
MEAN TEMPERATURE	TEMPERATURE MOYENNE
MINIMUM VALUE OF DEPTH	VALEUR MINIMUM DE H
NAMES OF POINTS	NOMS DES POINTS
NAMES OF TRACERS	NOMS DES TRACEURS
NODES DISTANCES DELWAQ FILE	FICHIER DELWAQ DES DISTANCES ENTRE NOEUDS
NON-DIMENSIONAL DISPERSION COEFFICIENTS	COEFFICIENTS ADIMENSIONNELS DE DISPERSION
NON-SUBMERGED VEGETATION FRICTION	FROTTEMENT POUR LA VEGETATION NON SUBMERGEE
NORTH	NORD
NUMBER OF CULVERTS	NOMBRE DE SIPHONS
NUMBER OF DROGUES	NOMBRE DE FLOTTEURS
NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS	NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES GRAPHIQUES
NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS	NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES LISTING
NUMBER OF LAGRANGIAN DRIFTS	NOMBRE DE DERIVES LAGRANGIENNES
NUMBER OF PRIVATE ARRAYS	NOMBRE DE TABLEAUX PRIVES
NUMBER OF SUB-ITERATIONS FOR NON-LINEARITIES	NOMBRE DE SOUS-ITERATIONS POUR LES NON-LINEARITES
NUMBER OF TIME STEPS	NOMBRE DE PAS DE TEMPS
NUMBER OF TRACERS	NOMBRE DE TRACEURS
NUMBER OF WEIRS	NOMBRE DE SEUILS
OPTION FOR LIQUID BOUNDARIES	OPTION POUR LES FRONTIERES LIQUIDES
OPTION FOR THE DIFFUSION OF TRACERS	OPTION POUR LA DIFFUSION DES TRACEURS
OPTION FOR THE DIFFUSION OF VELOCITIES	OPTION POUR LA DIFFUSION DES VITESSES
OPTION FOR THE SOLVER FOR K-EPSILON MODEL	OPTION DU SOLVEUR POUR LE MODELE K-EPSILON
OPTION FOR THE TREATMENT OF TIDAL FLATS	OPTION DE TRAITEMENT DES BANCS DECOUVRANTS
ORDINATES OF SOURCES	ORDONNEES DES SOURCES
ORIGIN COORDINATES	COORDONNEES DE L'ORIGINE
ORIGINAL DATE OF TIME	DATE DE L'ORIGINE DES TEMPS
ORIGINAL HOUR OF TIME	HEURE DE L'ORIGINE DES TEMPS
OUTPUT OF INITIAL CONDITIONS	SORTIE DES CONDITIONS INITIALES
PARALLEL PROCESSORS	PROCESSEURS PARALLELES
PARAMETER ESTIMATION	ESTIMATION DE PARAMETRE
PRECONDITIONING	PRECONDITIONNEMENT
PRECONDITIONING FOR DIFFUSION OF TRACERS	PRECONDITIONNEMENT POUR LA DIFFUSION DES TRACEURS

PRECONDITIONING FOR K-EPSILON MODEL	PRECONDITIONNEMENT POUR LE MODELE K-EPSILON
PRESCRIBED ELEVATIONS	COTES IMPOSEES
PRESCRIBED FLOWRATES	DEBITS IMPOSES
PRESCRIBED TRACERS VALUES	VALEURS IMPOSEES DES TRACEURS
PRESCRIBED VELOCITIES	VITESSES IMPOSEES
PREVIOUS COMPUTATION FILE	FICHIER DU CALCUL PRECEDENT
PREVIOUS COMPUTATION FILE FORMAT	FORMAT DU FICHIER DU CALCUL PRECEDENT
PRINTING CUMULATED FLOWRATES	IMPRESSION DU CUMUL DES FLUX
PRINTOUT PERIOD FOR DROGUES	PERIODE POUR LES SORTIES FLOTTEURS
PROPAGATION	PROPAGATION
RECORD NUMBER IN WAVE FILE	NUMERO DE L'ENREGISTREMENT DANS LE FICHIER DE HOULE
REFERENCE FILE	FICHIER DE REFERENCE
REFERENCE FILE FORMAT	FORMAT DU FICHIER DE REFERENCE
RESULTS FILE	FICHIER DES RESULTATS
RESULTS FILE FORMAT	FORMAT DU FICHIER DES RESULTATS
ROUGHNESS COEFFICIENT OF BOUNDARIES	COEFFICIENT DE RUGOSITE DES BORDS
SALINITY DELWAQ FILE	FICHIER DELWAQ DE LA SALINITE
SALINITY FOR DELWAQ	SALINITE POUR DELWAQ
SECTIONS INPUT FILE	FICHIER DES SECTIONS DE CONTROLE
SECTIONS OUTPUT FILE	FICHIER DE SORTIE DES SECTIONS DE CONTROLE
SISYPHE STEERING FILE	FICHIER DES PARAMETRES DE SISYPHE
SOLVER	SOLVEUR
SOLVER ACCURACY	PRECISION DU SOLVEUR
SOLVER FOR DIFFUSION OF TRACERS	SOLVEUR POUR LA DIFFUSION DES TRACEURS
SOLVER FOR K-EPSILON MODEL	SOLVEUR POUR LE MODELE K-EPSILON
SOLVER OPTION	OPTION DU SOLVEUR
SOLVER OPTION FOR TRACERS DIFFUSION	OPTION DU SOLVEUR POUR LA DIFFUSION DES TRACEURS
SOURCES FILE	FICHIER DES SOURCES
SPACING OF ROUGHNESS ELEMENTS	ESPACEMENT DES ELEMENTS DE FROTTEMENT
SPHERICAL COORDINATES	COORDONNEES SPHERIQUES
STAGE-DISCHARGE CURVES	COURBES DE TARAGE
STAGE-DISCHARGE CURVES FILE	FICHIER DES COURBES DE TARAGE
STOP CRITERIA	CRITERES D'ARRET
STOP IF A STEADY STATE IS REACHED	ARRET SI UN ETAT PERMANENT EST ATTEINT
SUPG OPTION	OPTION DE SUPG
TEMPERATURE DELWAQ FILE	FICHIER DELWAQ DE LA TEMPERATURE
TEMPERATURE FOR DELWAQ	TEMPERATURE POUR DELWAQ
THRESHOLD DEPTH FOR WIND	PROFONDEUR LIMITE POUR LE VENT
THRESHOLD FOR NEGATIVE DEPTHS	SEUIL POUR LES PROFONDEURS NEGATIVES
TIDAL FLATS	BANCS DECOUVRANTS
TIDE GENERATING FORCE	FORCE GENERATRICE DE LA MAREE
TIME RANGE FOR FOURIER ANALYSIS	BORNES EN TEMPS POUR L'ANALYSE DE FOURIER
TIME STEP	PAS DE TEMPS
TIME STEP REDUCTION FOR K-EPSILON MODEL	REDUCTION DU PAS DE TEMPS POUR LE MODELE K-EPSILON
TITLE	TITRE
TOLERANCES FOR IDENTIFICATION	PRECISIONS POUR L'IDENTIFICATION
TREATMENT OF NEGATIVE DEPTHS	TRAITEMENT DES HAUTEURS NEGATIVES
TREATMENT OF THE LINEAR SYSTEM	TRAITEMENT DU SYSTEME LINEAIRE
TURBULENCE MODEL	MODELE DE TURBULENCE
TURBULENCE MODEL FOR SOLID BOUNDARIES	REGIME DE TURBULENCE POUR LES PAROIS
TYPE OF ADVECTION	FORME DE LA CONVECTION
TYPE OF SOURCES	TYPE DES SOURCES
VALIDATION	VALIDATION
VALUES OF THE TRACERS AT THE SOURCES	VALEURS DES TRACEURS DES SOURCES
VARIABLE TIME-STEP	PAS DE TEMPS VARIABLE
VARIABLES FOR GRAPHIC PRINTOUTS	VARIABLES POUR LES SORTIES GRAPHIQUES
VARIABLES TO BE PRINTED	VARIABLES A IMPRIMER
VELOCITIES OF THE SOURCES ALONG X	VITESSES DES SOURCES SELON X
VELOCITIES OF THE SOURCES ALONG Y	VITESSES DES SOURCES SELON Y
VELOCITY DELWAQ FILE	FICHIER DELWAQ DE LA VITESSE
VELOCITY DIFFUSIVITY	COEFFICIENT DE DIFFUSION DES VITESSES
VELOCITY FOR DELWAQ	VITESSE POUR DELWAQ
VELOCITY PROFILES	PROFILS DE VITESSE
VERTICAL FLUXES DELWAQ FILE	FICHIER DELWAQ DES FLUX VERTICAUX
VERTICAL STRUCTURES	STRUCTURES VERTICALES
VOLUMES DELWAQ FILE	FICHIER DELWAQ DES VOLUMES
WATER DENSITY	MASSE VOLUMIQUE DE L'EAU
WATER DISCHARGE OF SOURCES	DEBITS DES SOURCES
WAVE DRIVEN CURRENTS	COURANTS DE HOULE
WIND	VENT

WIND VELOCITY ALONG X	VITESSE DU VENT SUIVANT X
WIND VELOCITY ALONG Y	VITESSE DU VENT SUIVANT Y

4 FRENCH/ENGLISH GLOSSARY OF KEYWORDS

ABSCISSES DES SOURCES	ABSCISSAE OF SOURCES
ACCELERATION DE LA PESANTEUR	GRAVITY ACCELERATION
ARRET SI UN ETAT PERMANENT EST ATTEINT	STOP IF A STEADY STATE IS REACHED
BANCS DECOUVRANTS	TIDAL FLATS
BILAN DE MASSE	MASS-BALANCE
BORNES EN TEMPS POUR L'ANALYSE DE FOURIER	TIME RANGE FOR FOURIER ANALYSIS
CALCUL COMPATIBLE DES FLUX	COMPATIBLE COMPUTATION OF FLUXES
CLIPPING DE H	H CLIPPING
COEFFICIENT DE CORIOLIS	CORIOLIS COEFFICIENT
COEFFICIENT DE DIFFUSION DES TRACEURS	COEFFICIENT FOR DIFFUSION OF TRACERS
COEFFICIENT DE DIFFUSION DES VITESSES	VELOCITY DIFFUSIVITY
COEFFICIENT DE FROTTEMENT	FRICTION COEFFICIENT
COEFFICIENT DE RUGOSITE DES BORDS	ROUGHNESS COEFFICIENT OF BOUNDARIES
COEFFICIENT D'IMPLICITATION DES TRACEURS	IMPLICITATION COEFFICIENT OF TRACERS
COEFFICIENT D'INFLUENCE DU VENT	COEFFICIENT OF WIND INFLUENCE
COEFFICIENTS ADIMENSIONNELS DE DISPERSION	NON-DIMENSIONAL DISPERSION COEFFICIENTS
COMPATIBILITE DU GRADIENT DE SURFACE LIBRE	FREE SURFACE GRADIENT COMPATIBILITY
CONDITIONS INITIALES	INITIAL CONDITIONS
CONTROLE DES LIMITES	CONTROL OF LIMITS
CONVECTION	ADVECTION
CONVECTION DE H	ADVECTION OF H
CONVECTION DE K ET EPSILON	ADVECTION OF K AND EPSILON
CONVECTION DE U ET V	ADVECTION OF U AND V
CONVECTION DES TRACEURS	ADVECTION OF TRACERS
COORDONNEES DE L'ORIGINE	ORIGIN COORDINATES
COORDONNEES SPHERIQUES	SPHERICAL COORDINATES
CORIOLIS	CORIOLIS
CORRECTION DE CONTINUITE	CONTINUITY CORRECTION
COTE INITIALE	INITIAL ELEVATION
COTES IMPOSEES	PRESCRIBED ELEVATIONS
COUPLAGE AVEC	COUPLING WITH
COURANTS DE HOULE	WAVE DRIVEN CURRENTS
COURBES DE TARAGE	STAGE-DISCHARGE CURVES
CRITERES D'ARRET	STOP CRITERIA
DATE DE L'ORIGINE DES TEMPS	ORIGINAL DATE OF TIME
DEBITS DES SOURCES	WATER DISCHARGE OF SOURCES
DEBITS IMPOSES	PRESCRIBED FLOWRATES
DEBUGGER	DEBUGGER
DEFINITION DE ZONES	DEFINITION OF ZONES
DIAMETRE DES ELEMENTS DE FROTTEMENT	DIAMETER OF ROUGHNESS ELEMENTS
DIFFUSION DES TRACEURS	DIFFUSION OF TRACERS
DIFFUSION DES VITESSES	DIFFUSION OF VELOCITY
DIFFUSION POUR DELWAQ	DIFFUSIVITY FOR DELWAQ
DISCRETISATIONS EN ESPACE	DISCRETIZATIONS IN SPACE
DONNEES POUR LE FROTTEMENT	FRICTION DATA
DUREE DU CALCUL	DURATION
EFFETS DE DENSITE	DENSITY EFFECTS
ELEMENTS MASQUES PAR L'UTILISATEUR	ELEMENTS MASKED BY USER
EQUATIONS	EQUATIONS
ESPACEMENT DES ELEMENTS DE FROTTEMENT	SPACING OF ROUGHNESS ELEMENTS
ESTIMATION DE PARAMETRE	PARAMETER ESTIMATION
FICHIER DE COMMANDE DELWAQ	DELWAQ STEERING FILE
FICHIER DE DONNEES BINAIRE 1	BINARY DATA FILE 1
FICHIER DE DONNEES BINAIRE 2	BINARY DATA FILE 2
FICHIER DE DONNEES FORMATE 1	FORMATTED DATA FILE 1
FICHIER DE DONNEES FORMATE 2	FORMATTED DATA FILE 2
FICHIER DE DONNEES POUR LE FROTTEMENT	FRICTION DATA FILE
FICHIER DE GEOMETRIE	GEOMETRY FILE
FICHIER DE REFERENCE	REFERENCE FILE
FICHIER DE RESULTATS BINAIRE	BINARY RESULTS FILE
FICHIER DE RESULTATS FORMATE	FORMATTED RESULTS FILE

FICHIER DE SORTIE DES SECTIONS DE CONTROLE	SECTIONS OUTPUT FILE
FICHIER DELWAQ DE LA DIFFUSION	DIFFUSIVITY DELWAQ FILE
FICHIER DELWAQ DE LA SALINITE	SALINITY DELWAQ FILE
FICHIER DELWAQ DE LA TEMPERATURE	TEMPERATURE DELWAQ FILE
FICHIER DELWAQ DE LA VITESSE	VELOCITY DELWAQ FILE
FICHIER DELWAQ DES DISTANCES ENTRE NOEUDS	NODES DISTANCES DELWAQ FILE
FICHIER DELWAQ DES ECHANGES ENTRE NOEUDS	EXCHANGES BETWEEN NODES DELWAQ FILE
FICHIER DELWAQ DES FLUX VERTICAUX	VERTICAL FLUXES DELWAQ FILE
FICHIER DELWAQ DES SURFACES DE FLUX	EXCHANGE AREAS DELWAQ FILE
FICHIER DELWAQ DES SURFACES DU FOND	BOTTOM SURFACES DELWAQ FILE
FICHIER DELWAQ DES VOLUMES	VOLUMES DELWAQ FILE
FICHIER DES CONDITIONS AUX LIMITES	BOUNDARY CONDITIONS FILE
FICHIER DES COURBES DE TARAGE	STAGE-DISCHARGE CURVES FILE
FICHIER DES FONDS	BOTTOM TOPOGRAPHY FILE
FICHIER DES FRONTIERES LIQUIDES	LIQUID BOUNDARIES FILE
FICHIER DES PARAMETRES DE SISYPHE	SISYPHE STEERING FILE
FICHIER DES RESULTATS	RESULTS FILE
FICHIER DES SECTIONS DE CONTROLE	SECTIONS INPUT FILE
FICHIER DES SOURCES	SOURCES FILE
FICHIER DU CALCUL PRECEDENT	PREVIOUS COMPUTATION FILE
FICHIER FORTRAN	FORTRAN FILE
FONCTION COUT	COST FUNCTION
FORCE GENERATRICE DE LA MAREE	TIDE GENERATING FORCE
FORMAT DU FICHIER DE GEOMETRIE	GEOMETRY FILE FORMAT
FORMAT DU FICHIER DE REFERENCE	REFERENCE FILE FORMAT
FORMAT DU FICHIER DES RESULTATS	RESULTS FILE FORMAT
FORMAT DU FICHIER DU CALCUL PRECEDENT	PREVIOUS COMPUTATION FILE FORMAT
FORME DE LA CONVECTION	TYPE OF ADVECTION
FROTTEMENT POUR LA VEGETATION NON SUBMERGEE	NON-SUBMERGED VEGETATION FRICTION
HAUTEUR DANS LES TERMES DE FROTTEMENT	DEPTH IN FRICTION TERMS
HAUTEUR INITIALE	INITIAL DEPTH
HEURE DE L'ORIGINE DES TEMPS	ORIGINAL HOUR OF TIME
IMPLICITATION POUR LA DIFFUSION DES VITESSES	IMPLICITATION FOR DIFFUSION OF VELOCITY
IMPLICITATION POUR LA HAUTEUR	IMPLICITATION FOR DEPTH
IMPLICITATION POUR LA VITESSE	IMPLICITATION FOR VELOCITY
IMPRESSION DU CUMUL DES FLUX	PRINTING CUMULATED FLOWRATES
INFORMATIONS SUR LE MODELE K-EPSILON	INFORMATION ABOUT K-EPSILON MODEL
INFORMATIONS SUR LE SOLVEUR	INFORMATION ABOUT SOLVER
LANGUE	LANGUAGE
LATITUDE DU POINT ORIGINE	LATITUDE OF ORIGIN POINT
LISSAGES DU FOND	BOTTOM SMOOTHINGS
LISTE DE POINTS	LIST OF POINTS
LISTE DES FICHIERS	LIST OF FILES
LOI DE FROTTEMENT SUR LE FOND	LAW OF BOTTOM FRICTION
LONGITUDE DU POINT ORIGINE	LONGITUDE OF ORIGIN POINT
MASSE VOLUMIQUE DE L'EAU	WATER DENSITY
MASS-LUMPING SUR H	MASS-LUMPING ON H
MASS-LUMPING SUR LA VITESSE	MASS-LUMPING ON VELOCITY
MAXIMUM D'ITERATIONS POUR K ET EPSILON	MAXIMUM NUMBER OF ITERATIONS FOR K AND EPSILON
MAXIMUM D'ITERATIONS POUR LA DIFFUSION DES TRACEURS	MAXIMUM NUMBER OF ITERATIONS FOR DIFFUSION OF TRACERS
MAXIMUM D'ITERATIONS POUR LE SOLVEUR	MAXIMUM NUMBER OF ITERATIONS FOR SOLVER
MAXIMUM D'ITERATIONS POUR L'IDENTIFICATION	MAXIMUM NUMBER OF ITERATIONS FOR IDENTIFICATION
METHODE D'IDENTIFICATION	IDENTIFICATION METHOD
MODELE DE TURBULENCE	TURBULENCE MODEL
NOMBRE DE COURANT SOUHAITE	DESIRED COURANT NUMBER
NOMBRE DE DERIVES LAGRANGIENNES	NUMBER OF LAGRANGIAN DRIFTS
NOMBRE DE FLOTTEURS	NUMBER OF DROGUES
NOMBRE DE PAS DE TEMPS	NUMBER OF TIME STEPS
NOMBRE DE SEUILS	NUMBER OF WEIRS
NOMBRE DE SIPHONS	NUMBER OF CULVERTS
NOMBRE DE SOUS-ITERATIONS POUR LES NON-LINEARITES	NUMBER OF SUB-ITERATIONS FOR NON-LINEARITIES
NOMBRE DE TABLEAUX PRIVES	NUMBER OF PRIVATE ARRAYS
NOMBRE DE TRACEURS	NUMBER OF TRACERS
NOMBRE MAXIMUM DE DOMAINES DE FROTTEMENT	MAXIMUM NUMBER OF FRICTION DOMAINS
NOMS DES POINTS	NAMES OF POINTS
NOMS DES TRACEURS	NAMES OF TRACERS
NORD	NORTH
NUMERO DE L'ENREGISTREMENT DANS LE FICHIER DE HOULE	RECORD NUMBER IN WAVE FILE
NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES GRAPHIQUES	NUMBER OF FIRST TIME STEP FOR GRAPHIC PRINTOUTS
NUMERO DU PREMIER PAS DE TEMPS POUR LES SORTIES LISTING	NUMBER OF FIRST TIME STEP FOR LISTING PRINTOUTS
OPTION DE SUPG	SUPG OPTION

OPTION DE TRAITEMENT DES BANCS DECOUVRANTS	OPTION FOR THE TREATMENT OF TIDAL FLATS
OPTION DU SOLVEUR	SOLVER OPTION
OPTION DU SOLVEUR POUR LA DIFFUSION DES TRACEURS	SOLVER OPTION FOR TRACERS DIFFUSION
OPTION DU SOLVEUR POUR LE MODELE K-EPSILON	OPTION FOR THE SOLVER FOR K-EPSILON MODEL
OPTION POUR LA DIFFUSION DES TRACEURS	OPTION FOR THE DIFFUSION OF TRACERS
OPTION POUR LA DIFFUSION DES VITESSES	OPTION FOR THE DIFFUSION OF VELOCITIES
OPTION POUR LES FRONTIERES LIQUIDES	OPTION FOR LIQUID BOUNDARIES
ORDONNEES DES SOURCES	ORDINATES OF SOURCES
ORDRE DU TIR INITIAL POUR H	INITIAL GUESS FOR H
ORDRE DU TIR INITIAL POUR U	INITIAL GUESS FOR U
PAS DE TEMPS	TIME STEP
PAS DE TEMPS VARIABLE	VARIABLE TIME-STEP
PERIODE DE COUPLAGE	COUPLING PERIOD
PERIODE DE SORTIE LISTING	LISTING PRINTOUT PERIOD
PERIODE DE SORTIE POUR DELWAQ	DELWAQ PRINTOUT PERIOD
PERIODE POUR LES SORTIES FLOTTEURS	PRINTOUT PERIOD FOR DROGUES
PERIODE POUR LES SORTIES GRAPHIQUES	GRAPHIC PRINTOUT PERIOD
PERIODES D'ANALYSE DE FOURIER	FOURIER ANALYSIS PERIODS
PRECISION DU SOLVEUR	SOLVER ACCURACY
PRECISION POUR LA DIFFUSION DES TRACEURS	ACCURACY FOR DIFFUSION OF TRACERS
PRECISION SUR EPSILON	ACCURACY OF EPSILON
PRECISION SUR K	ACCURACY OF K
PRECISIONS POUR L'IDENTIFICATION	TOLERANCES FOR IDENTIFICATION
PRECONDITIONNEMENT	PRECONDITIONING
PRECONDITIONNEMENT C-U	C-U PRECONDITIONING
PRECONDITIONNEMENT POUR LA DIFFUSION DES TRACEURS	PRECONDITIONING FOR DIFFUSION OF TRACERS
PRECONDITIONNEMENT POUR LE MODELE K-EPSILON	PRECONDITIONING FOR K-EPSILON MODEL
PRESSION ATMOSPHERIQUE	AIR PRESSURE
PROCESSEURS PARALLELES	PARALLEL PROCESSORS
PRODUIT MATRICE-VECTEUR	MATRIX-VECTOR PRODUCT
PROFILS DE VITESSE	VELOCITY PROFILES
PROFONDEUR LIMITE POUR LE VENT	THRESHOLD DEPTH FOR WIND
PROFONDEUR MOYENNE POUR LA LINEARISATION	MEAN DEPTH FOR LINEARIZATION
PROPAGATION	PROPAGATION
PROPAGATION LINEARISEE	LINEARIZED PROPAGATION
REDUCTION DU PAS DE TEMPS POUR LE MODELE K-EPSILON	TIME STEP REDUCTION FOR K-EPSILON MODEL
REGIME DE TURBULENCE POUR LES PAROIS	TURBULENCE MODEL FOR SOLID BOUNDARIES
REMISE A ZERO DU TEMPS	INITIAL TIME SET TO ZERO
SALINITE POUR DELWAQ	SALINITY FOR DELWAQ
SCHEMA EN VOLUMES FINIS	FINITE VOLUME SCHEME
SECTIONS DE CONTROLE	CONTROL SECTIONS
SEUIL POUR LES PROFONDEURS NEGATIVES	THRESHOLD FOR NEGATIVE DEPTHS
SOLVEUR	SOLVER
SOLVEUR POUR LA DIFFUSION DES TRACEURS	SOLVER FOR DIFFUSION OF TRACERS
SOLVEUR POUR LE MODELE K-EPSILON	SOLVER FOR K-EPSILON MODEL
SORTIE DES CONDITIONS INITIALES	OUTPUT OF INITIAL CONDITIONS
SORTIE LISTING	LISTING PRINTOUT
STOCKAGE DES MATRICES	MATRIX STORAGE
STRUCTURES VERTICALES	VERTICAL STRUCTURES
SUITE DE CALCUL	COMPUTATION CONTINUED
TEMPERATURE MOYENNE	MEAN TEMPERATURE
TEMPERATURE POUR DELWAQ	TEMPERATURE FOR DELWAQ
TITRE	TITLE
TRAITEMENT DES HAUTEURS NEGATIVES	TREATMENT OF NEGATIVE DEPTHS
TRAITEMENT DU SYSTEME LINEAIRE	TREATMENT OF THE LINEAR SYSTEM
TYPE DES SOURCES	TYPE OF SOURCES
VALEUR MINIMUM DE H	MINIMUM VALUE OF DEPTH
VALEUR PAR DEFAUT DU MANNING POUR LA LOI DE COLEBROOK-WHITE	MANNING DEFAULT VALUE FOR COLEBROOK-WHITE LAW
VALEURS DES TRACEURS DES SOURCES	VALUES OF THE TRACERS AT THE SOURCES
VALEURS IMPOSEES DES TRACEURS	PRESCRIBED TRACERS VALUES
VALEURS INITIALES DES TRACEURS	INITIAL VALUES OF TRACERS
VALEURS LIMITES	LIMIT VALUES
VALIDATION	VALIDATION
VARIABLES A IMPRIMER	VARIABLES TO BE PRINTED
VARIABLES POUR LES SORTIES GRAPHIQUES	VARIABLES FOR GRAPHIC PRINTOUTS
VENT	WIND
VITESSE DU VENT SUIVANT X	WIND VELOCITY ALONG X
VITESSE DU VENT SUIVANT Y	WIND VELOCITY ALONG Y
VITESSE POUR DELWAQ	VELOCITY FOR DELWAQ
VITESSES DES SOURCES SELON X	VELOCITIES OF THE SOURCES ALONG X

VITESSES DES SOURCES SELON Y
VITESSES IMPOSEES

VELOCITIES OF THE SOURCES ALONG Y
PRESCRIBED VELOCITIES