**BOUMUST User`s Manual**

User’s Manual

## Input

Following are descriptions of parameters in input.txt (NOTE: all parameter names are capital sensitive)

**PROJECTNAME:** name of your project, used for log file and project folder.

**SPECIFICATION OF EQUATION**

EqID: governing equation

EqID=23: GN equation.

EqID=1: nonlinear shallow water equation.

**SPECIFICATION OF DIMENSION**

Mglob: global dimension in  direction.

Nglob: global dimension in  direction.

SPECIFICATION OF GRID SIZE

DX: grid size(m) in  direction.

DY: grid size(m) in  direction.

**SPECIFICATION OF TIME**

TOTAL\_TIME: simulation time in seconds

PLOT\_INTV\_SNAPSHOT: output interval in seconds (Note, output time is not exact because adaptive dt is used.)

PLOT\_INTV\_GAGE: time interval (s) of gauge output.

SCREEN\_INTV: time interval (s) of screen print.

**SPECIFICATION OF BATHYMETRY**

DEPTH\_TYPE: depth input type.

DEPTH\_TYPE=DATA: from a depth file (depth.txt).

The program includes several simple bathymetry configurations such as

DEPTH\_TYPE=FLAT: flat bottom, need DEPTH\_FLAT.

DEPTH\_TYPE=SLOPE: plane beach along  direction. It needs three parameters: slope, SLP, slope starting point, Xslp and depth of flat part, DEPTH\_FLAT.

DEPTH\_FILE: bathymetry file if DEPTH\_TYPE=DATA, the file name must be ‘depth.txt’, and file dimension should be  with the first point as the south-west corner. The read format in the code is shown below.

DO J=1, Nglob

READ(1,\*) (Depth(I,J), I=1,Mglob)

ENDDO

DEPTH\_FLAT: water depth of flat bottom if DEPTH\_TYPE=FLAT or DEPTH\_TYPE=SLOPE (flat part of plane beach).

SLP： slope if DEPTH\_TYPE=SLOPE

Xslp: starting (m) of a slope, if DEPTH\_TYPE=SLOPE

**SPECIFICATION OF INITIAL CONDITION**

INT\_UVZ: logical parameter for initial condition, default is FALSE.

INI\_U: logical parameter for initial , default is FALSE, the name of file must be U.txt, data format is the same as depth data.

INI\_V: logical parameter for initial , default is FALSE, the name of file must be V.txt, data format is the same as depth data.

INI\_Z: logical parameter for initial , default is FALSE, the name of file must be Z.txt, data format is the same as depth data.

**SPECIFICATION OF WAVEMAKER**

WAVEMAKER: wavemaker type.

WAVEMAKER=LEF\_SOL: left boundary solitary, need AMP, DEP and LAGTIME.

WAVEMAKER=INI\_SOL: initial solitary wave, WKN B solution, need AMP, DEP and XWAVEMAKER.

WAVEMAKER=INI\_REC: initial rectangular hump, need XC, YC and WID.

WAVEMAKER=WK\_REG: Wei and Kirby 1999 internal wave maker, need XC\_WK, Tperiod,, AMP\_WK, DEP\_WK, Theta\_WK, and Time\_ramp(factor of period).

WAVEMAKER=WK\_IRR: Wei and Kirby 1999 TMA spectrum wavemaker, need XC\_WK, DEP\_WK, Time\_ramp, Delta\_WK, FreqPeak, FreqMin, FreqMax, Hmo, GammaTMA, ThetaPeak

WAVEMAKER=WK\_TIME\_SERIES: fft time series to get each wave component and then use Wei and Kirby’s (1999) wavemaker. Need input WaveCompFile (including 3 columns: per,amp,pha) and NumWaveComp,PeakPeriod,DEP\_WK,Xc\_WK,Ywidth\_WK.

WAVEMAKER=WK\_SRC\_SERIES:

AMP: amplitude (m) of initial , if WAVEMAKER = INI REC, WAVEMAKER = INI SOL,

WAVEMAKER = LEF SOL.

DEP: water depth at wavemaker location, if WAVEMAKER = INI SOL, WAVEMAKER = LEF SOL.

LAGTIME, time lag (s) for the solitary wave generated on the left boundary, e.g., WAVEMAKER

= LEF SOL.

XWAVEMAKER:  (m) coordinate for WAVEMAKER = INI SOL.

Xc:  (m) coordinate of the center of a rectangular hump if WAVEMAKER = INI REC.

Yc:  (m) coordinate of the center of a rectangular hump if WAVEMAKER = INI REC.

WID: width (m) of a rectangular hump if WAVEMAKER = INI REC, or INI GAU.

Time ramp: time ramp (s) for Wei and Kirby (1999) wavemaker.

Delta WK: width parameter δ for Wei and Kirby (1999) wavemaker. δ = 0.3 ∼ 0.6

DEP WK: water depth (m) for Wei and Kirby (1999) wavemaker.

Tperiod: period (s) of regular wave for Wei and Kirby (1999) wavemaker.

AMP WK: amplitude (m) of regular wave for Wei and Kirby (1999) wavemaker.

Theta WK: direction (degrees) of regular wave for Wei and Kirby (1999) wavemaker. Note: it

may be adjusted for a periodic boundary case by the program. A warning will be given if

adjustment is made.

FreqPeak: peak frequency (1/s) for Wei and Kirby (1999) irregular wavemaker.

FreqMin: low frequency cutoff (1/s) for Wei and Kirby (1999) irregular wavemaker.

FreqMax: high frequency cutoff (1/s) for Wei and Kirby (1999) irregular wavemaker.

Hmo: Hmo (m) for Wei and Kirby (1999) irregular wavemaker.

GammaTMA, TMA parameter *γ* for Wei and Kirby (1999) irregular wavemaker.

ThetaPeak: peak direction (degrees) for Wei and Kirby (1999) irregular wavemaker.

Sigma\_Theta: parameter of directional spectrum for Wei and Kirby (1999) irregular wavemaker.

SPECIFICATION OF PERIODIC BOUNDARY CONDITION

(Note: only south-north periodic condition was implemented)

PERIODIC: logical parameter for periodic boundary condition, T-periodic, F-wall boundary condition.

**SPECIFICATION OF SPONGE LAYER**

SPONGE\_ON: logical parameter, T – sponge layer, F – no sponge layer.

Sponge west width: width (m) of sponge layer at west boundary.

Sponge east width: width (m) of sponge layer at east boundary.

Sponge south width: width (m) of sponge layer at south boundary.

Sponge north width width (m) of sponge layer at north boundary

R sponge: decay rate in sponge layer. Its values are between 0.85 *∼* 0.95.

A sponge: maximum damping magnitude. The value is *∼* 5.0.