PennState Integrated Hydrologic Model (PIHM)

Version: 2.0

Output File Formats

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Hydrology Group
Civil & Environmental Engineering
Pennsylvania State University, University Park, USA

PIHM Output File Format

PIHM simulation generates several output files. The content of such files are either state variables or flux from an element numerical representation of the model domain. Such elemental numerical representations are triangular elements for the land mass and rectangular elements for the stream reaches. PIHM calculates various vertical and lateral fluxes across these elements and simulates the state variables such as groundwater level, stream head etc. For complete list of the file output from the PIHM refer to the table 1.1 below.

Table 1.1: PIHM output files and its brief description along with the units for the datasets

File type	Simulated Data	Units
.is	Interception Storage	meters
.snow	Snow accumulation (water equivalent)	meters
.surf	Surface Water	meters
.unsat	Soil Moisture	meters
.GW	Groundwater Head	meters
.et0	Evaporation from Canopy	meters/day
.et1	Transpiration	meters/day
.et2	Evaporation from Ground Surface	meters/day
.infil	Infiltration Rate	meters/day
.Rech	Recharge Rate	meters/day
.stage	River stage	meters
.rbed	River bed storage	meters
.rivFlx0	Lateral influx to the stream reach	meters/day
.rivFlx1	Lateral outflow from stream reach	meters/day
.rivFlx2	Surface flow to stream reach from Left terrain	meters/day
.rivFlx3	Surface flow to stream reach from right terrain	meters/day
.rivFlx4	Baseflow to stream reach from aquifer on the left	meters/day
.rivFlx5	Baseflow to stream reach from aquifer on the right	meters/day
.rivFlx6	Leakage between stream reach and river bed	meters/day
.rivFlx7	Subsurface flow to the river bed from left aquifer	meters/day
.rivFlx8	Subsurface flow to the river bed from right aquifer	meters/day
.rivFlx9	Lateral outflux to the bed beneath river	meters/day
.rivFlx10	Lateral influx to the bed beneath river	meters/day

Note that which data types are printed and at what interval (aka averaging interval) are specified in the <project ID>.para input file. In the para file there are two types of input. The first set of control variables determines which data types will be printed (1 :: Print, 0 :: Don't Print). The second set of control variables determine at what interval data will be printed. Depending on the print interval you specify for each output data (state or flux) a mean value over that specified period of time are calculated and printed in those files.

First column has time information in **minutes**. Time is referenced from the start of the simulation. Following columns contains the output data (state or flux) for each triangular mesh or stream reach. A new row is inserted for each new time step. Suppose the modeling domain has '**m**' number of triangular meshes and '**s**' number of stream segments. For any print variable of interest you specified a print interval as '**n**' (minutes). Also the simulation start time is 0 (minutes) and the simulation end time is '**N**' x '**n**' time units. The output file for stream and triangular mesh element will look like the following tables 1.2 and 1.3 respectively.

Table 1.2: File format for the simulated data for stream reaches

n	str(n,1)	str(n,2)	...	str(n,s-1)	str(n,s)
2*n	str(2*n,1)	str(2*n,2)	...	str(2*n,s-1)	str(2*n,s)
3*n	...	...	...	...	...
4*n	str(N*n,1)	str(N*n,2)	...	str(N*n,s-1)	str(N*n,s)

Table 1.3: File format for the simulated data for the triangular meshes

n	mesh(n,1)	mesh (n,2)	...	mesh (n,m-1)	mesh (n,m)
2*n	mesh (2*n,1)	mesh (2*n,2)	...	mesh (2*n,m-1)	mesh (2*n,m)
3*n	...	...	...	...	...
4*n	mesh (N*n,1)	mesh (N*n,2)	...	mesh (N*n,m-1)	mesh (N*n,m)

Example:

Consider the following figure as an example model domain (project ID example). Corresponding this model domain the simulated stream flow (meters/day) and groundwater level from the bed at 1-hour print interval will look like the following two tables:
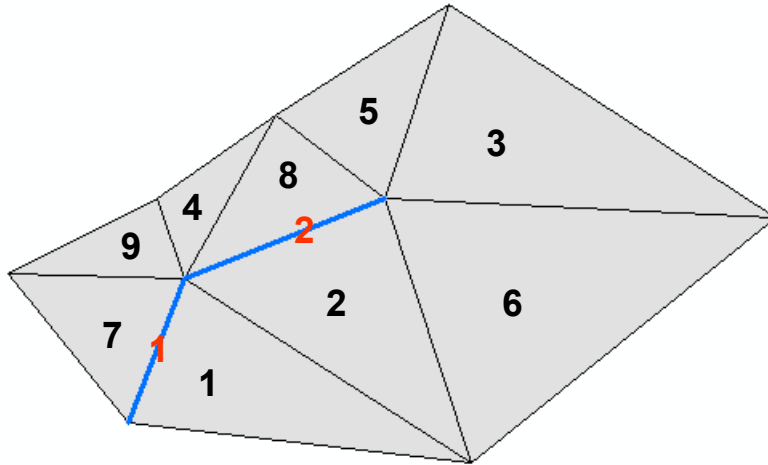

Figure 1.1: An example numerical representation of the model domain with 9 triangular mesh and 2 stream reaches

File: example.rivFlx1

60	300.000000	100.000000
120	500.000000	150.000000
180	400.000000	125.000000
...	...	...

File: example.GW

60	5.0	4.0	2.0	4.0	2.0	2.0	5.0	4.0	4.0
120	5.1	4.1	2.1	4.1	2.1	2.1	5.1	4.1	4.1
180	5.2	4.2	2.2	4.2	2.2	2.2	5.2	4.2	4.2
...	...	...	...	...	...	...	...	...	...

Note ASCII output files can easily be opened in any text editor or MS Excel. It can be very easily imported to the Matlab workspace.