

# node-export v0.1

## FEFLOW IFM plug-in

### Nodal data export in transient simulations

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## 1 Objective

Export to TXT selected nodal data from transient simulations at selected times by the user. It is compiled for FEFLOW 7 64bit. Figure (1) shows an export example which contains: node number, coordinates, simulation time (days), hydraulic head, saturation, and outflow. Outflow is the boundary component of the budget made at the node. In a pumping well, the boundary component of the budget is equal to pumping rate.

	Node	X	Y	Z	Time	Head	Saturation	Outflow
1	378827	6074.19	10657.8	3712.08	0.127	3830.77	1	-4320
2	378827	6074.19	10657.8	3712.08	1.023	3825.35	1	-4320
3	378827	6074.19	10657.8	3712.08	6.047	3819.48	1	-4320
4	378827	6074.19	10657.8	3712.08	10.047	3817.12	1	-4320
5	378827	6074.19	10657.8	3712.08	20.047	3812.87	1	-4320
6	378827	6074.19	10657.8	3712.08	50.047	3803.36	1	-4320
7	378827	6074.19	10657.8	3712.08	70.047	3797.36	1	-4320
8	378827	6074.19	10657.8	3712.08	100.047	3938.92	1	3712.08
9	378827	6074.19	10657.8	3712.08	150.047	3966.48	1	3712.08
10	378827	6074.19	10657.8	3712.08	200.047	3969.63	1	3712.08
11	378827	6074.19	10657.8	3712.08	250.047	3970.39	1	3712.08
12	378827	6074.19	10657.8	3712.08	300.047	3970.74	1	3712.08
13	378827	6074.19	10657.8	3712.08	350.906	3970.99	1	3712.08
14	378827	6074.19	10657.8	3712.08	400.906	3971.22	1	3712.08
15	378827	6074.19	10657.8	3712.08	500.906	3971.52	1	3712.08
16	378827	6074.19	10657.8	3712.08				

Figure 1: Text file export example

## 2 How it works

The plug-in needs two TXT input files to work:

1. a node list where the data will be collected and later exported. Remember node number = node ID -1.
2. a time-step list at which data is exported

Both files are lists. The plug-in reads them and stores them in vectors. At every `Post-TimeStep` callback, the plug-in compares the simulation time with the next time-step in the list. If the simulation time is greater, a data export is made.

Finally at leave `OnLeaveSimulator` callback a final data export is made. But the final export lacks the last column with the outflow value since budget data is lost once the simulation ends.

### 3 How to use the plug-in

#### 3.1 Generate input files for the plug-in

Figure (2(a)) is an example of the node list for export. Every line is 1 node, 16 nodes total. Figure (2(b)) is a list of simulation times for export.

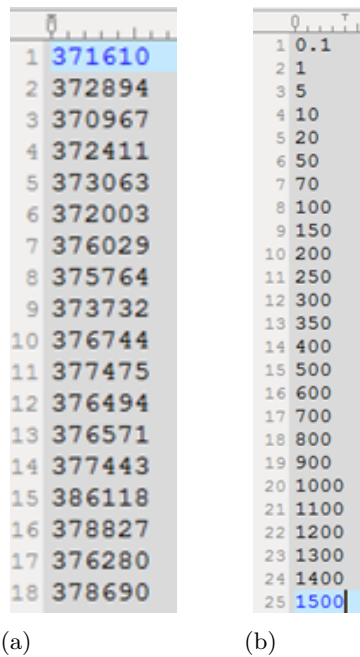


Figure 2: a) list of node numbers, b) list of export times in days

#### 3.2 Add the plug-in to the simulation

Follow FEFLOW online help:

<http://www.feflow.info/html/help/HTMLDocuments/reference/panels/plugins.htm>

#### 3.3 Edit plug-in properties

Once the plug-in is attached to the simulation the plug-ins panel should look like figure (3.3)

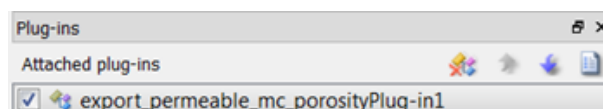


Figure 3: Plug-in in plug-ins panel

A right-click on it opens a menu, select properties and the window shown in figure () opens:

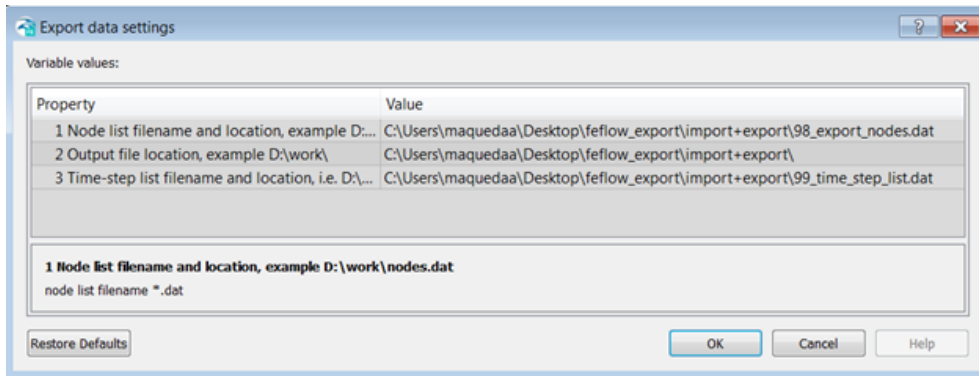


Figure 4: Plug-in properties

The values can be modified according to the locations of both input files.

1. value 1 is for the location of the file containing the list of nodes for export
2. value 2 is the location of the directory where export files will be saved. In the example there are 16 nodes, thus there are 16 exports files named 1 to 16 corresponding to the order of the nodes in the input file.
3. value 3 is the location of the file with the time-step list.

Click OK and store the values. If the simulation is saved, values 1, 2 and 3 are saved also at the end of the FEM file and are recovered when the FEM file is used in following simulations.

### 3.4 Run the simulation

The simulation can be run now and data will be exported at the times set in the time-step input file. While the simulation is running export files are generated in the selected path. The directory looks like figure (3.4).

Name	Date modified	Type	Size
1.dat	17/11/2016 09:02 ...	UltraEdit Docume...	2 KB
2.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
3.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
4.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
5.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
6.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
7.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
8.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
9.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
10.dat	17/11/2016 09:03 ...	UltraEdit Docume...	2 KB
11.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
12.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
13.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
14.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
15.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
16.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
17.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
18.dat	17/11/2016 09:04 ...	UltraEdit Docume...	2 KB
BC_values_validation.dat	10/11/2016 02:39 ...	UltraEdit Docume...	1 KB
export_nodes.dat	10/11/2016 03:01 ...	UltraEdit Docume...	1 KB
time_step_list.dat	15/11/2016 05:52 ...	UltraEdit Docume...	1 KB

Figure 5: Export directory

### 3.5 GitHub project file list

1. `export_permeable_mc_porosityPlug-in1.dll` - compiled solution. DLL ready to use in FEFLOW 7
2. `export_permeable_mc_porosityPlug-in1.cpp` - C++ source code for the plug-in