

Universität Stuttgart

BASEGEM BETA 1

TUTORIAL

DIEGO BERAMENDI ORTEGA
YOMER CISNEROS AGUIRRE

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• STUTTGART - GERMANY •

BASEGEM BETA 1 Tutorial

The first step is to create a project folder that contains an *initial model.json* file and a *mesh.2dm* file, whose name for this example is '*finalmeshfive.2dm*'.

Important elements of the *initial model.json* file are:

“discharge”: 9.5

“default_friction”: 35.0

“simulation_name”: “mySim”

```
"HYDRAULICS": {  
  "BOUNDARY": {  
    "STANDARD": [  
      {  
        "discharge": 9.5,  
        "name": "Inflow",  
        "slope": 0.0056,  
        "string_name": "Inflow",  
        "type": "uniform_in"  
      },  
      {  
        "name": "Outflow",  
        "string_name": "Outflow",  
        "type": "zero_gradient_out"  
      },  
      {  
        "simulation_name": "mySim"  
      }  
    ],  
    "type": "strickler"  
  },  
  "FRICTION": {  
    "default_friction": 35.0,  
    "regions": [  
      {  
        "friction": 35.0,  
        "region_name": "riverbed"  
      },  
      {  
        "friction": 45.0,  
        "region_name": "concreteweir"  
      }  
    ]  
  }  
}
```

Fig. 1 – Initial model.json file, important: discharge, default_friction values, simulation_name: “mySim”.

We start the application *Basegem Beta 1* from the command prompt (**basegem.py**). The GUI of the app will be displayed:

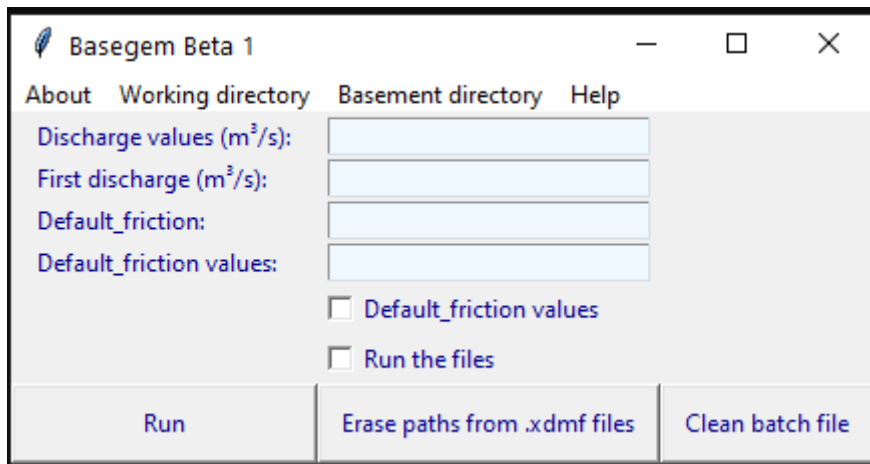


Fig. 2 – GUI from *Basegem Beta 1*.

First, the Working directory has to be selected, then immediately the *results.json* and *simulation.json* file are copied from the *Basegem Beta 1* folder to the select directory:

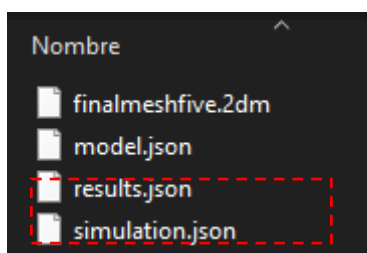


Fig.3 – Content of the working directory.

The installation path of Basement must be selected. Normally if it is stored in the 'C' drive it looks like this: "C:/Program Files/BASEMENT 3.1.0/bin".

In the working directory a *backup.txt* was created containing the installation path of basement; so from now on, that directory is not necessary to be selected any more since Basegem will read it from the *backup.txt* file.

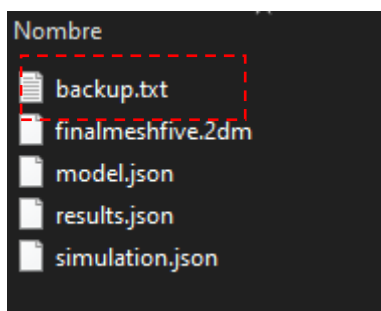


Fig. 4 – *Backup.txt* file in working directory.

We will create *model.json* files with the following discharge values: 9.50 12.75 15.50 . The first discharge value corresponds to the value from the *initial model.json* file, which is 9.5, and the *default_friction* is equal to 35.0. As we want to run the files immediately, the *Run the files* checkbox is marked.

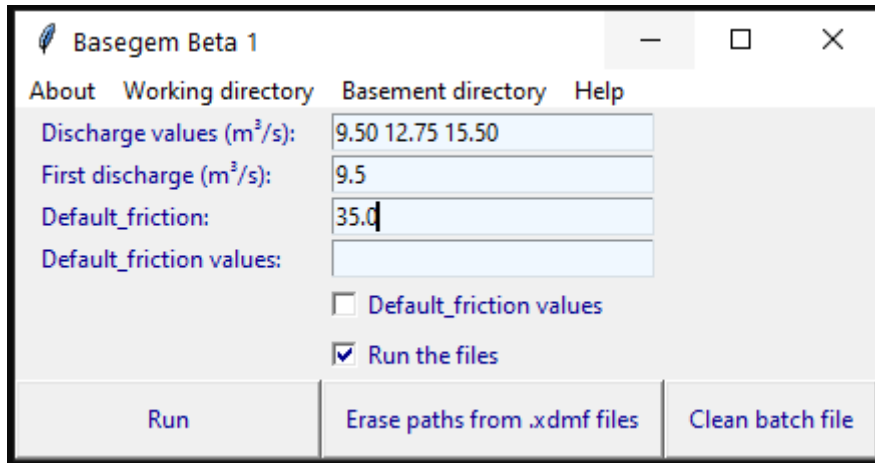


Fig. 5 – GUI with input data.

As soon as we press the button *Run* three folders named Q9_50, Q12_75 and Q15_50 are created, containing the modified *model.json* files, together with the *results.json* and *simulation.json* files and Basement will run them in batch mode.

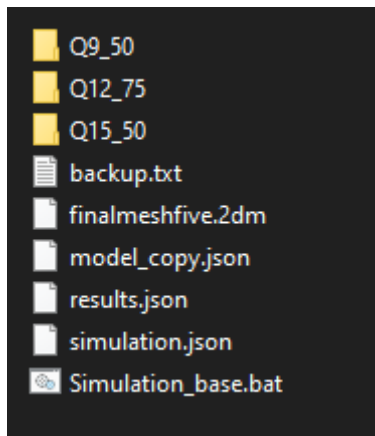


Fig. 6 – Working directory with folders of the scenarios created.

```

-----
BASEMENT successfully processed all necessary jobs!

D:\WAREM\third_semester\Python\Teamproject\example_basegem1>
ion.json -r D:\WAREM\third_semester\Python\Teamproject\exam
BASEMENT v3.1.0
BASEplane OpenMP binary
v3.1.0
Copyright: (C) 2020 ETH Zurich / Laboratory of hydraulics, h

-> composing the model from archive
-> found aggregate <hydraulics_aggr>
-> found aggregate <hyd_boundary_aggr>
-> found aggregate <hyd_friction_aggr>
-> running on 4 threads

Initializing OP2
Writing '/RESULTS/CellsAll/HydState/0000000' to file 'D:\WAR
-> Progress: 0/100, dt = 0.02 [s], RTS = 0
-> simulation started!
-> press ctrl+c to abort after the current timestep
-> Progress: 2/100, dt = 95 [s], RTS = 2494.43
-> Progress: 2/100, dt = 0.0425062 [s], RTS = 2343.8
MASS BALANCE PROBLEM: h = -0.301855 < 0.0
Writing '/RESULTS/CellsAll/HydState/0000001' to file 'D:\WAR
-> Progress: 3/100, dt = 0.00956451 [s], RTS = 45.4734
-> Progress: 4/100, dt = 0.010852 [s], RTS = 22.1446
-> Progress: 5/100, dt = 0.0108675 [s], RTS = 17.6658
Writing '/RESULTS/CellsAll/HydState/0000002' to file 'D:\WAR
-> Progress: 6/100, dt = 0.0108677 [s], RTS = 14.7537
-> Progress: 7/100, dt = 0.0108677 [s], RTS = 13.1392
-> Progress: 8/100, dt = 0.0108677 [s], RTS = 12.4035
Writing '/RESULTS/CellsAll/HydState/0000003' to file 'D:\WAR

```

Fig. 7 – Initialization of the batch running of Basement.

Additionally, the *Simulation_base.bat* is created.

If the checkbox *Run the files* is not marked before pressing the *Run* button, the simulation can still be started by double-clicking on the *Simulation_base.bat* file. Then, the paths from the .xdmf files can be erased with the *Basegem Beta 1* application. It simply has to be started, then the directory has to be selected and the button *Erase path from .xdmf files* has to be pressed.

It is important to mention that when a simulation scenario ends the system will ask to press a key in order to continue with the next scenario. This can be avoided by deleting the *Pause* word from the code of the *basegem.py* script between the line 306 and 325.

```

-> composing the model from archive
-> found aggregate <hydraulics_aggr>
-> found aggregate <hyd_boundary_aggr>
-> found aggregate <hyd_friction_aggr>

-----
BASEMENT successfully processed all necessary jobs!

:\WAREM\third_semester\Python\Teamproject\example_ba
resione una tecla para continuar . . .

```

Fig. 8 – Communication of Basement on the successful process.

The results are showed below. Now the *results.xdmf* files of every scenario can be seen in *Paraview* and *Qgis* and then convert them into *raster.tiff* maps to be used as data for the *Aquafuzzy* package.

```
D:\WAREM\third_semester\Python\Teamproject\example_basegem1>PAUSE
Presione una tecla para continuar . . .
D:\WAREM\third_semester\Python\Teamproject\example_basegem1\Q12_75\mySim_output.xdmf
D:\WAREM\third_semester\Python\Teamproject\example_basegem1\Q15_50\mySim_output.xdmf
D:\WAREM\third_semester\Python\Teamproject\example_basegem1\Q9_50\mySim_output.xdmf
The paths from .xdmf files were deleted
model_copy.json has changed to model.json
basement_generator took 1906.218 seconds
```

Fig. 9 – End of the batch process of Basement.

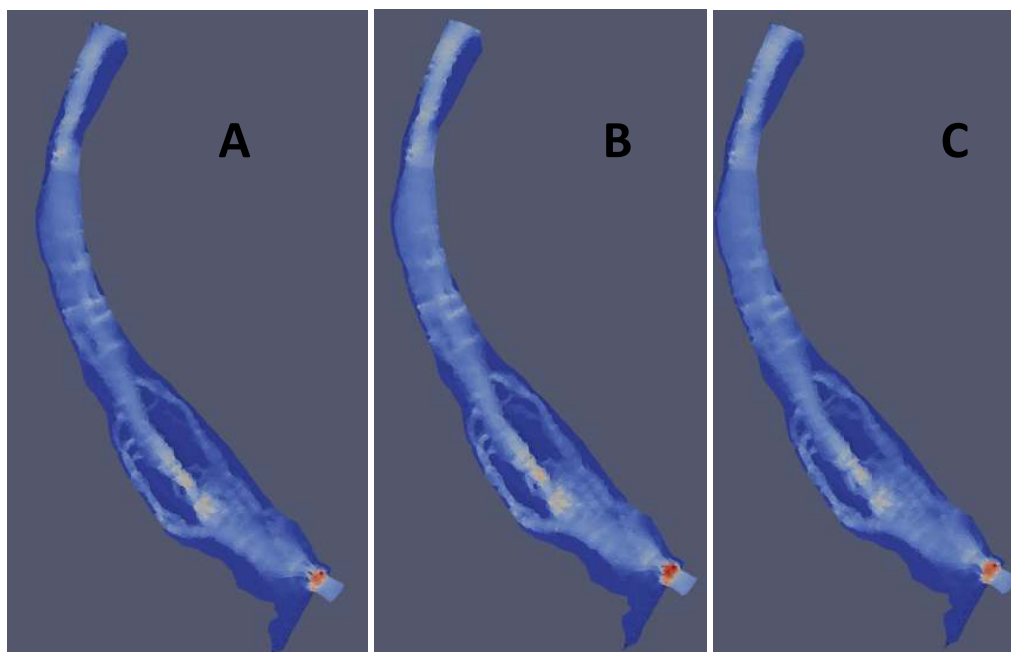


Fig. 10 - .xdmf files loaded in Paraview. A=Q9_50, B=Q12_75 and C=Q15.50

If different *discharge values* and different *default_friction* values are required, the entry box *Default_friction values* must be filled in and the check box of the same name has also to be marked.

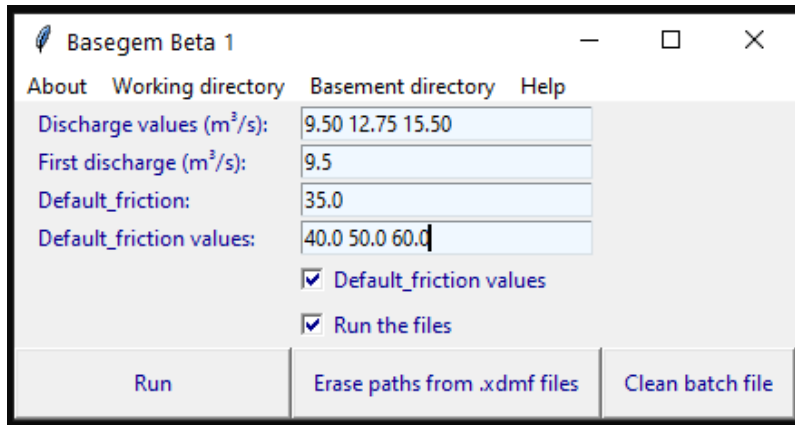


Fig. 11 – GUI with discharge values and default_friction values.

In order to clean *Simulation_base.bat* file, the application can be started, the working directory selected and then the button *Clean batch file* pressed.