
WORKFLOW OF MESHFREE

MESHFREE-Team, January 2023

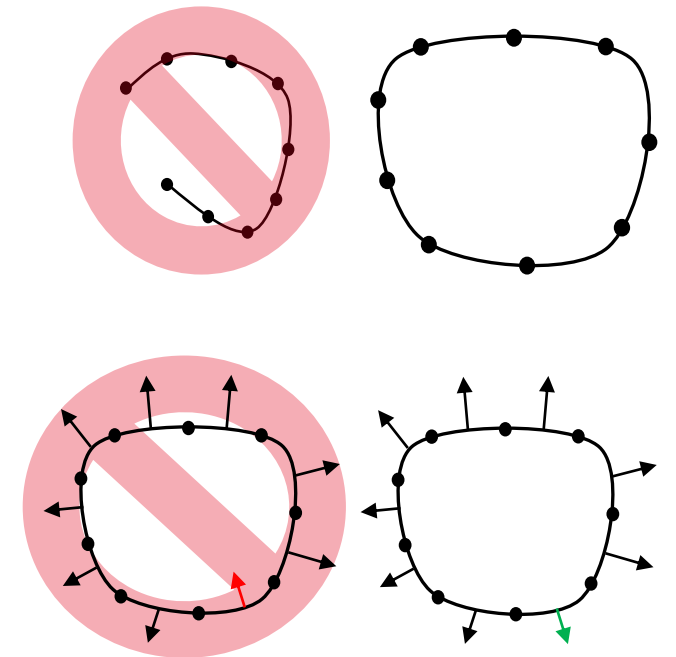
WORKFLOW OF MESHFREE

- Preparation of surface mesh
- Setup of input files
- Execution of simulation
- Analysis of simulation results
- Trouble-shooting

Preparation of surface mesh

2D surface mesh of bounding/effective geometry (geometrical entities that might come into contact with the simulated fluid during a simulation)

- Accepted formats: ASCII stl, msh, obj
- Geometrical parts that will have different functions during the simulation have to be named uniquely, e.g. "inflow", "outflow", "wall", etc.
- The geometry has to be closed ("watertight").
- The orientation of the normals has to be consistent.
- Intersections between geometrical entities should be avoided.
- If wetting on both sides of a geometrical entity might occur during the simulation, this entity has to be represented as double-walled geometrical item with appropriate thickness.



Setup of input files

- **USER_common_variables.dat**: simulation script
 - Custom scripting language (case sensitive)
 - Online documentation
 - Ucv_DEFAULT.dat
- **common_variables.dat**: numerical parameters, e.g. point cloud parameters (not to be changed by the user)



Execution of simulation

- Install MESHFREE as described in InstallationGuide
 - Set local license file if available
 - Install Intel MPI for parallel computation
- Navigate to the location of the input files
- Run MESHFREE

Example:

```
cd /path/to/input/files
export MESHFREE_LICENSE_FILE=/path/to/local/license/file.lcs
mpirun -n 2 /path/to/meshfree.x
```



Analysis of simulation results

ParaView (<https://www.paraview.org>)




- View simulation results in EnSight format
- Analyze geometry and point cloud attributes
 - Filtering (threshold, clip)
 - Calculations
- Creation of videos

→ See also 10_ParaViewForMESHFREE.pdf



Trouble-shooting

MESHFREE "output"

- Console output
- warnings file (location of simulation run) 
 - Collects all warnings that are also present in the console output
- FPM_log folder (location of simulation run) 
 - Stores information on the MESHFREE variables, parameters, etc
- TIMECHECK 
 - Stopwatches to analyze the performance

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