

# OpenGeoSys workflow

*Reza Taherdangkoo<sup>1</sup>*

<sup>1</sup>*TU Bergakademie Freiberg, Institute of Geotechnics, Gustav-Zeuner-Str. 1, 09599, Freiberg, Germany*

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Corresponding author, [reza.Taherdangkoo@ifgt.tu-freiberg.de](mailto:reza.Taherdangkoo@ifgt.tu-freiberg.de)

## 1 Quadratic mesh

1. Create a mesh using Gmsh, and then export it as a vtk file.
2. Ogs tools:
  - a) use `checkMesh -p -v <domain>.vtu` to check for problems
  - b) `NodeReordering -i <domain>.vtu -o <domain-correct-node>.vtu`
  - c) any message about more than zero potentially collapsable nodes? Then:  
use `reviseMesh -e 1e-3 -s -i <domain-correct-node>.vtu -o <simplified-domain-correct-node>.vtu`  
to fix this
  - d) use `createQuadraticMesh -o <quad-simplified-domain-correct-node>.vtu -i <simplified-domain-correct-node>.vtu` to get the quadratic mesh
3. Open Paraview and follow this:
  - a) use `SplitView` → `SpreadsheetView` to select all 2D elements
  - b) search in Filters for the tool `ExtractSelection`
  - c) by applying this, you extract all and only the (selected) 2D elements of your mesh
  - d) Save Data (domain) as ascii vtu
  - e) go back to original file / undo the selection
  - f) again use `SplitView` → `SpreadsheetView` to select all 1D elements of one boundary
  - g) again apply `ExtractSelection`
  - h) Save Data (boundary) as ascii vtu (for the first boundary)
  - i) repeat for all the other boundaries
4. Text editor: in the mesh and all the boundary files do the following:
  - a) rename `CellEntityIds` to `MaterialIDs`
  - b) change numbers of `MaterialIDs` starting from 0 (instead of 1)
  - c) change `<DataArray type="Int64" Name="vtkOriginalPointIds">` to `<DataArray type="UInt64" Name="bulk_node_ids">`
  - d) change `<DataArray type="Int64" Name="vtkOriginalCellIds">` to `<DataArray type="UInt64" Name="bulk_element_ids">`

- e) change `<DataArray type="Float32">` to `<DataArray type="Float64">`
- f) save the mesh and all the boundary files