HOMEWORK: extending your FEM simulation framework

- So far you have writtne a Python script that creates a text-inputfile for oofem. Executing this (oofem – f task2.in) produces result files
- The task is now, to read one of the result files (e.g. taskX.out) and to store the stress and strain data into a PYTHON numpy array so that we can postprocess the data subsequently
- Point of departure is the file task4.py in the directory 'task4'. The tasks are also described in details there (search for the TODO sections)
- HINT: you should write a function in the file oofem_utils.py. This will be then imported by the line import oofem_utils as oofem
  A function of this file can be used by 'oofem.my_func(...)'

Overview over the HOMEWORK tasks:

1. convert your script that generates the inputfile into a function and store it in the file oofem_utils.py. Add the function parameter and use them in the function
2. Test the function and make yourself familiar with the data structure 'sim' that is returned from oofem.readOutputfile. Manuel Leimberger (who wrote this – thanks!) also added documentation in the file
3. Extract strain data avstrain.yy (=ε_{yy}) from sim and store it into a numpy array.
4. plot the data from avstrain.yy and check that everything is fine by comparing it with the paraview output (set the data type to IST_StrinaTensor, 4, Surface with edges) (Hint: 0:epsxx, 1:epsxy, 2:epsxz, 3:epsyx, 4:epsyy,...)
5. Add another function for writing oofem inputfile write_J2plasti_inputfile(lx,ly,nodes_x,nodes_y,dv, infile, outfile). This should use a plasticity material model (see next slide). All you have to do is to change material model from IsoLE to J2mat 2 d 1. Ry 0.3 E 1.0 n 0.33 IHM 0.4 tAlpha 0.0

OOFEM Material Models (http://www.oofem.org/resources/doc/matlibmanual/html)
Mises plasticity model with isotropic and kinematic hardening

Description	Linear isotropic elastic material
Record Format	**J2mat** num(in) # d(rn) # Ry # E(rn) # n(rn) # IHM # tAlpha(rn) #
Parameters	- *num* material model number - *d* material density - Ry yield stress - E Youngs modulus - N Poisson ratio - IHM isotropic hardening modulus - KHM kinematic hardening modulus - *tAlpha* thermal dilatation coefficient
Supported modes	3dMat, PlaneStress, PlaneStrain, 1dMat, 2dPlateLayer, 2dBeamLayer, 3dShellLayer, 2dPlate, 2dBeam, 3dShell, 3dBeam, PlaneStressRot
Features	Adaptivity support

Example: J2mat 2 d 1. Ry 1.7 E 1.0 n 0.33 IHM 0.4 tAlpha 0.0