1st example: rigid spherical inclusions in an elastic media

step 1 : part creation (in this case merging two sphere and a cube)
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step 2: properties assignment, in this case two elastic and isotropic behavior but homtools is not limited to a particular behavior
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step 3: step definition, in this linear (small strain) but homtools can be used with nlgeom option
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step 4: mesh definition, Homtools required a mesh to generate linear equations on the boundary. For each meshing modification the equations needs to be re-generated by homtools (old equations needs to be previously deleted)
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step 5: Homtools is available from the plug-ins menu in the interaction module.
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step 5: Reference points creations for macro stress or strain (two ref points are needed in the case of small strain)
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step 5: Choice of a homogeneisation method: in this case Kinematic Uniform Boundary Conditions (KUBC)
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step 5: The two ref points are selected and 6 faces of the cube define the boundary sets
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step 5: Homtools generates the constraint equations (linear relations between reference nodes and boundary nodes) on the boundary sets
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step 6: Macro strains (resp. stresses) are defined from displacement boundary conditions (resp. load condition) specified at the ref nodes. In this case (3D small strains) at ref node 1 we have $E_{11}, E_{22}, E_{33}$ and $2E_{12}, 2E_{13}, 2E_{23}$ at ref node 2.
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step 7: Job submission and local results, nothing special compare standard results
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step 7: Macro stress/strain relationship is easily obtained by creating xydata from odbfield at reference points. Macro strain correspond to variable U, macro stress correspond to variable RF at ref nodes.