SENSITIVITY TO PARAMETERS IN NON-DARCY FLOW MODEL FROM PORESCALE THROUGH MESOSCALE

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Summary. In previous work [1, 2, 3] we considered computational upscaling of flow at porescale with inertia effects to mesoscale for isotropic geometries as well as discussed related experimental results. Furthermore in [4] we considered upscaling of Forchheimer flow from mesoscale to macroscale. In our algorithms we consider a) a traditional Navier-Stokes solver at porescale with general triangular mesh and b) a cell-centered finite difference method at Darcy scale on rectangular grids. All examples assumed isotropic porous media.

In this contribution we consider anisotropic geometry at porescale and a general anisotropic non-Darcy model of flow at mesoscale or macroscale which extends known formulations. We discuss sensitivity of flow results to the functional form of non-Darcy model with special attention devoted to anisotropy. We also formally compute sensitivity of a chosen quantity of interest at mesoscale and macroscale to the chosen model i.e. to the parameters at porescale and at mesoscale.

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