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Effect of yield stress in a two phase pore network model

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Non newtonian fluids in porous media flow offers complex interplays that are not fully understood. The Bingham rheology is an approximation of the rheology of a non-Newtonian fluid presenting yield stress, which are useful in several engineering applications, as reinforcement of soils by injection of slurries [1] and in the timely topic of fracking processes [2]. The subject is notoriously hard to study numerically, as we have a nonlinear rheology in a complex porous structure, but there has been recent advances in the field, for instance in characterizing a Darcy law [3]. This work aims to investigate the flow conditions of the Bingham body in complex geometries by using a Pore Network Model with a fairly novel numerical solver in the Augumented Lagrangian Method – a method recently introduced by Talon and Hansen [4]. We are using the model to describe the qualitative behaviors of the yield stress effect, and have characterized a power law behavior that deviates from existing litterature, as found in [3] and [5].

Participation

In-Person

References

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