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On the determination of a generalized Darcy equation for yield stress fluid in porous media using a LB TRT scheme[1] LAURENT TALON, THIBAUD CHEVALIER, lab. FAST, UPMC, CNRS UMR7608 — Non-Newtonian fluids have practical applications in very different domains. Indeed, polymer mixture, paints, slurries, colloidal suspensions, emulsions, foams or heavy oil present complex rheologies. Among the large number of different non-Newtonian fluids an important class of behavior is represented by the yield-stress fluids, viz. fluids that require a minimum of stress to flow. Yield stress fluids are usually modelled as a Bingham fluid or by the Herschel-Bulkley equation. However, simulating flow of a Bingham fluid in porous media still remains a challenging task as the yield stress may significantly alter the numerical stability and precision. In the present work, we use a Lattice-Boltzmann TRT scheme to determine this type of flow in a synthetic porous medium or fracture. Different pressure drops ΔP have been applied in order to derive a generalization of the Darcy's equation. Three different scaling regimes can be distinguished when plotting the dimensionless flow rate q as function of the distance to the critical pressure $\Delta P - \Delta P_c$. In this presentation, we will investigate the importance of the heterogeneities on those flowing regimes.

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