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Interception efficiency in flow of power-law fluids past confined porous bodies SETAREH SHAHSAVARI, GARETH MCKINLEY, Massachusetts Inst of Tech-MIT — Understanding the flow of power-law fluids through porous media is important for a wide range of filtration and sedimentation processes. In this study, the mobility of power-law fluids through porous media is investigated numerically and we use parametric studies to systematically understand the individual roles of geometrical characteristics, rheological properties as well as flow conditions. In addition, an analytical solution is presented that can be used as a modified Darcy law for generalized Newtonian fluids. Building on this modified Darcy law, the incompressible laminar flow of power-law and Carreau fluids past a confined porous body is modeled numerically. From the simulations we calculate the flow interception efficiency, which provides a measure of the fraction of streamlines that intercept a porous collector. Finally, the interception efficiency of power-law fluids are compared with the case of a Newtonian fluid. The focus of this work is principally for flow of inelastic fluids in fibrous media; however, the methodology can also be extended to other porous media.

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