



Rheology enhanced transport in Non-Newtonian porous media flows

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Flow and transport in porous media is of great interest in Earth Science, including oil extraction and groundwater hydrology. The disordered pore-structure leads heterogeneous flow patterns and preferential flow paths. Here we show how the fluid's rheology can be used to control the transport properties inside a porous medium. We find that for a Bingham type rheology, the fluid has a characteristic Reynolds number for which the flow is least localized, resulting in enhanced channelized transport. The increased channelization of the flow leads to a corresponding maximum in permeability. This result has important consequences for the design of chemical reactors, heat transfer and reactive transport in porous media in general.