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Viscous and viscoelastic fingering FAHED ALBREIKI, ALEXANDER KUBINSKI, University of Illinois at Chicago, PRERANA RATHORE, University of Massachusetts at Amherst, ANDREW RASMUSSEN, VIVEK SHARMA, University of Illinois at Chicago — The displacement of more viscous fluid by a lower viscosity fluid in quasi two dimensional flow created in so called Hele Shaw cell is observed to create complex fingering patterns. The viscosity ratio of inner and outer fluid is known to influence the shape and shape evolution of fingers in the case when both fluids are Newtonian. In this contribution, we examine the influence of viscoelasticity on onset and evolution of fingering instabilities, by utilizing model viscoelastic fluids with rate-independent shear viscosity. The analysis of viscoelastic fingering is complemented by a careful evaluation of shear and extensional viscosity as well as Normal stress differences, and their role in determining the outcomes for interfacial instabilities.

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