

Abstract Submitted
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Universality Results for Multi-Layer Hele-Shaw and Porous Media Flows¹ PRABIR DARIPA, Texas A&M University — Saffman-Taylor instability is a well known viscosity driven instability of an interface. Motivated by a need to understand the effect of various injection policies currently in practice for chemical enhanced oil recovery, we study linear stability of displacement processes in a Hele-Shaw cell involving injection of an arbitrary number of immiscible fluid phases in succession. This is a problem involving many interfaces. Universal stability results have been obtained for this multi-layer (multi-region) flow in the sense that the results hold with arbitrary number of interfaces. These stability results have been applied to design injection policies that are considerably less unstable than the pure Saffman-Taylor case. In particular, we determine specific values of the viscosity of the fluid layers corresponding to smallest unstable band. Moreover, we discuss universal selection principle of optimal viscous profiles. The talk is based on following papers.

P. Daripa and X. Ding, “Universal Stability Properties for Multi-Layer Hele-Shaw Flows and Application to Instability Control,” SIAM J. Appl. Math., To Appear.

P. Daripa and X. Ding, “Selection principle of optimal profiles for Multi-Layer flows,” Trans. Porous Media, To Appear.

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