

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Universality Results for Multi-phase Hele-Shaw Flows¹ PRABIR DARIPA, Texas A&M University, College Station, Texas — Saffman-Taylor instability is a well known viscosity driven instability of an interface separating two immiscible fluids. We study linear stability of displacement processes in a Hele-Shaw cell involving an arbitrary number of immiscible fluid phases. This is a problem involving many interfaces. Universal stability results have been obtained for this multi-phase immiscible flow in the sense that the results hold for arbitrary number of interfaces. These stability results have been applied to design displacement processes that are considerably less unstable than the pure Saffman-Taylor case. In particular, we derive universal formula which gives specific values of the viscosities of the fluid layers corresponding to smallest unstable band. Other similar universal results will also be presented. The talk is based on the following paper.

[1] Prabir Daripa and Xueru Ding, “Universal Stability Properties for Multi-Layer Hele-Shaw Flows and Application to Instability Control,” *SIAM Journal of Applied Mathematics*, Vol 72, No. 5, pp. 1667-1685, 2012.

¹This work was supported by the Qatar National Research Fund (a member of The Qatar Foundation).

Prabir Daripa
Texas A&M University, College Station, Texas

Date submitted: 11 Nov 2012

Electronic form version 1.4