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**Stability Results on Multi-Layer Hele-Shaw Flows** CRAIG GIN, PRABIR DARIPA, Texas A&M University — Saffman-Taylor instability, which occurs when a less viscous fluid drives a more viscous fluid, has been studied for many years and has a wide range of applications. In particular, an understanding of this phenomenon is helpful in the attempt to maximize the effectiveness of chemically enhanced oil recovery techniques. We study this instability through linear stability analysis of multi-layer radial Hele-Shaw flows of immiscible fluids. We take classic results on the instability of flows consisting of two fluids and extend them to flows with an arbitrary number of fluid phases. Using upper bound results on the growth rate of instabilities obtained in this general setting, we are able to give conditions under which this regime is less unstable than the single interface case.

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