Stability Results on Multi-Layer Radial Hele-Shaw Flows with Variable Viscosity CRAIG GIN, PRABIR DARIPA, Texas A&M Univ — 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 three-layer radial Hele-Shaw flows of immiscible fluids in which the middle layer consists of a variable viscosity fluid. We study the growth rate of instabilities both numerically and analytically, including the derivation of upper bounds. We also connect this problem to the related cases of variable viscosity rectilinear flows and constant viscosity radial flows. We attempt to extend this work to an arbitrary number of fluid layers.

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