NEW BOUNDS FOR STABILIZING HELE-SHAW FLOWS

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Abstract. We consider the problem of displacement processes in a three-layer fluid in a Hele-Shaw cell modeling enhanced oil recovery processes by polymer flooding. The middle layer sandwiched between water and oil contains polymer-thickened-water. We provide lower bounds on the length of the intermediate layer and on the amount of polymer in the middle layer for stabilizing the leading front to a specified level. We also provide an upper bound on the growth rate of instabilities for a given viscous profile of the middle layer.

Key words and phrases. Saffman-Taylor instability, Hele-Shaw flows, Tertiary displacement processes, Sturm-Liouville problem, Dispersion relation.

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