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Marangoni instabilities in two-layer systems due to concentration dependent transfer properties P.M.J. TREVELYAN, Universite Libre de Bruxelles, Brussels, Belgium, V. PIMIANTA, Universite Paul Sabatier, Toulouse, France, K. ECKERT, Dresden University of Technology, Dresden, Germany, A. DE WIT, Universite Libre de Bruxelles, Brussels, Belgium — We consider a Hele-Shaw cell containing two immiscible liquids. A chemical species initially dissolved in an organic phase crosses the interface into the aqueous phase. In the aqueous phase this chemical reactant is involved in a reaction producing a surfactant which undergoes micellisation when the critical micelle concentration is reached. These micelles increase solubility which in turn increases the transfer rate and hence favours additional formation of micelles. To model such an autocatalytic increase of solubility, we consider here that the partition coefficient is a function of the surfactant concentration. Through the solutal Marangoni effect, this surfactant can induce tangential stresses leading to interfacial motion. The aim of our study is to theoretically examine the conditions for an instability in such a system. In particular, we seek to understand whether Marangoni effects can be observed because of a concentration dependent partition coefficient in a system that would be stable in the case of a constant partition coefficient according to the classical stability conditions of Sternling and Scriven (AIChE J., 5, p.514, 1959).

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