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Efficient numerical computation of fluid interfaces with soluble surfactant (I) an inviscid drop MICHAEL BOOTY, MICHAEL SIEGEL, New Jersey Institute of Technology — We address a difficulty in the computation of fluid interfaces with soluble surfactant. At the large values of bulk Peclet number typical of fluid-surfactant systems, a transition layer forms adjacent to the interface in which the surfactant concentration varies rapidly, while its gradient at the interface must be evaluated accurately to determine bulk-interface exchange of surfactant, surface tension, and the drop's dynamics. We present a fast and accurate hybrid numerical method that incorporates a separate singular perturbation reduction of the transition layer into a full numerical solution of the interfacial free boundary problem. Results are presented for an inviscid drop in the Stokes flow limit, where the underlying flow solver for insoluble surfactant uses conformal mapping techniques in two dimensions. This facilitates comparison of the hybrid method with a traditional numerical method at moderately large Peclet number.

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