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**Thickening Effect of Surfactants in the Dragout Coating Problem**

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PRABIR DARIPA, Texas A&M University — We study the dip coating flow on a flat plate which is being withdrawn from a liquid bath. This problem was considered in the seminal paper of Landau and Levich (1942). A similar problem, concerning the motion of long bubbles in capillary tubes was considered by Bretherton (1961). In both problems, it is important to study the effects produced by interfacial surfactant. Bretherton reported that the thickness of the film left behind the moving front could be increased by the presence of surfactant. The same result was obtained in several papers using numerical methods. In the present paper, we consider the drag-out problem with a small variation of an insoluble surfactant. We obtain a formula for an upper bound in terms of the Marangoni and Capillary number. The main result is following: the upper bound is less in the “clean” case (without surfactant) consistent with previous numerical results. We use the lubrication approximation and the “flux” method. A perturbation analysis of the equations of fluid flow is performed to obtain the result.

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