

Abstract Submitted
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The effect of evaporation and Marangoni stresses on contact line instability JILL KLENTZMAN, University of Arizona, VLADIMIR AJAEV, Southern Methodist University — We investigate the contact line instability for the flow of viscous liquid on a heated inclined plane. Numerical simulations are conducted based on a model of the flow derived in our previous work using a lubrication-type approach including the effects of evaporation of the liquid. The impact of Marangoni stresses on the instability development is examined, and the value of the inclination angle of the solid surface is varied to study its effect. Unlike evaporation, which was shown in our previous work to inhibit the instability, Marangoni stresses promote the instability. Stability criteria for different inclination angles are expressed in terms of the modified Marangoni number and the evaporation number, a nondimensional measure of the mass flow rate across the interface. As a result of the development of instability, a finger-like structure is formed. The fingers grow initially, but then saturate at a length which depends on the evaporation conditions.

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