Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Flow of an infinite fluid strip down an inclined plane: Contact line stability JUAN M. GOMBA, JAVIER DIEZ, ROBERTO GRATTON, ALEJANDRO G. GONZÁLEZ, IFAS, UNCPBA, Argentina., LOU KONDIC, New Jersey Institute of Technology, Newark, USA. — We present a computational study on the flow of a fluid strip down an inclined plane. Unlike the commonly considered case of constant film thickness far behind the contact line, this flow involves a finite cross section and therefore it does not admit a traveling wave solution; instead, the base flow is time- dependent. Consequently, the equations that governs the evolution of both the base state and of the perturbation must be solved simultaneously. The computations show that, imposed perturbations travel with the same velocity as the leading contact line. The spectral analysis of the modes evolution shows that their growth rates are time-dependent. The wavelength of the mode with maximum amplitude decreases with time until it reaches an asymptotic value, λ_{max}. We explore the dependence of λ_{max} on the cross sectional fluid area, A, and on the inclination angle of the plane, α. For the considered small A, corresponding to small Bond numbers, we find that the dependence of λ_{max} on A is in good agreement with experimental data (Gomba et al, Phys. Rev. E 71, 016304, 2005). This dependence differs from the one observed for films characterized by much larger cross sectional areas and Bond numbers.

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Date submitted: 31 Jul 2007 Electronic form version 1.4