Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Dynamics of Marangoni Driven thin film flows SHOMEEK MUKHOPADHYAY, ROBERT BEHRINGER, Physics Department and Center for Nonlinear and Complex Systems, Duke University, Durham, NC – 27708 — We study the dynamics of thermally driven Marangoni flows of Polydimethylsiloxane(PDMS or silicone oil) on a completely wetting silicon wafer. A thin film of silicone oil is driven up the inclined plane against gravity by imposing a temperature gradient. Previous work has focused on the formation of 'shock' structures and the analysis of fingers in thermally driven thin film flows. In this study we will perform a detailed analysis of how the contact line emerges from the meniscus. As the contact line emerges from the reservoir, the formation of a 'precursor' or 'foot' is seen. We study the emergence of this 'precursor' as a function of the temperature gradient, angle of inclination and the deposited film thickness. In particular we consider the case where the meniscus typically shows a 'dip' before decaying into the flat film as opposed to a 'monotonic' decay. Such a meniscus shape has been predicted on theoretical grounds for very thick films by Muench and Evans.

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Date submitted: 26 Jul 2006 Electronic form version 1.4