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Thin film flows over Structured Substrates ALEX ORON, Department of Mechanical Engineering, Technion - Israel Institute of Technology, Haifa 32000, Israel, SHOMEEK MUKHOPADHYAY, Physics Department, Duke University, ROBERT BEHRINGER, Physics Department and Center for Nonlinear and Complex Systems, Duke University, Durham, NC - 27708 — The dynamics of liquids over patterned substrates has been of tremendous interest because of applications in microfluidics and in creating specially engineered 'non – stick' surfaces. We study both experimentally and numerically, the limiting case of completely wetting silicone oil (PDMS) on a silicone wafer on which is deposited a 'step like' precursor layer of the oil. Step like precursors of PDMS are deposited ranging in viscosity from 50 centistokes to 10000 centistokes. Silicone oil is driven up an inclined plane against gravity by imposing a temperature gradient. As the contact line emerges from the reservoir it shows a 'hyberbolic tamgent' shape near the step and the flat film near the front is non trivially modified in the presence of the step. We describe the formation and evolution of the perturbed contact line in the 'lubrication theory' approximation. In this particular case the flow field is analyzed in three separate regions and then 'matched' across the step. The presence of the 'hyberbolic tangent' shape is markedly different from other corner flow problems in thin film flows.

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