Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Viscous rivulet flow over trenches[1] THOMAS WARD, North Carolina State University, G.M. HOMSY, University of California Santa Barbara — The dynamic interfacial behavior of an advancing rivulet encountering a trench of square cross-section is studied experimentally at low capillary and Reynolds numbers. Trench depths vary from slightly smaller than to slightly larger than the capillary length. The fluids are a glycerol/water mixture and a silicone oil, representing a partially wetting and a nearly complete wetting fluid, respectively, and the rivulet interface is observed using low speed CCD imaging. A rich variety of phenomenon is observed in this range of depths suggesting that trench wetting is greatly affected by a combination of geometry and dynamic contact angle. The dynamics are characterized by measuring the local film height as a function of time and are compared with the theory of Gramlich et al. (Phys. Fluid, 2004). In spite of the fact that the theory is 2D while the experiments are 3D, remarkably good qualitative agreement is observed for large trench depths and partially wetting fluids.

[1]NC Space Grant

Thomas Ward
North Carolina State University

Date submitted: 11 Aug 2009 Electronic form version 1.4