Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Capillary Levelling of Stepped Polymer Films - A Nanofluidic Probe of the Slip Boundary Condition OLIVER BAEUMCHEN, JOSHUA D. MCGRAW, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1, THOMAS SALEZ, MICHAEL BENZAQUEN, Laboratoire de Physico-Chimie Theorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, PAUL FOWLER, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1, ELIE RAPHAEL, Laboratoire de Physico-Chimie Theorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, KARI DALNOKI-VERESS, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1 — For flows on small length scales, the hydrodynamic boundary condition of a liquid at a solid surface plays an enormous role. In recent years much has been learned about this slip boundary condition from flows that are driven by internal, capillary, forces such as dewetting of thin liquid films. For the case of dewetting, holes in the film grow, driven by exposing the underlying substrate. Here, we present the opposite approach: We show that the capillary levelling of initially curved surfaces, in our case stepped polymer films, is sensitive to the nanorheological properties of the liquid and the dependence on the slip boundary condition at the buried liquid/substrate interface. A thin film model which includes the slip boundary condition enables us to quantify the boundary condition at the buried interface and the dependence of slip on the molecular weight of the polymers used.

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Date submitted: 27 Nov 2012 Electronic form version 1.4