Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Relaxation and Intermediate Asymptotics of a Surface Perturbation in a Viscous Film OLIVER BÄUMCHEN, Max Planck Institute for Dynamics & Self-Organization, 37077 Göttingen, Germany, MICHAEL BENZAQUEN, THOMAS SALEZ, Laboratoire de Physico-Chimie Theorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, JOSHUA D. MCGRAW, Department of Experimental Physics, Saarland University, 66123 Saarbrücken, Germany, MATILDA BACKHOLM, PAUL FOWLER, Department of Physics and Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, Canada, ELIE RAPHAËL, Laboratoire de Physico-Chimie Theorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, KARI DALNOKI-VERESS, Department of Physics and Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, Canada — The surface of a thin liquid film with nonconstant curvature flattens as a result of capillary forces. While this leveling process is driven by local curvature gradients, the global boundary conditions greatly influence the dynamics. Here, we study the evolution of rectangular trenches in a polystyrene nanofilm. We report on full agreement between theory and experiments for the capillary-driven flow and resulting time dependent height profiles, a crossover in the power-law dependence of the viscous energy dissipation as a function of time as the trench evolution transitions from two noninteracting to interacting steps, and the convergence of the profiles to a universal self-similar attractor that is given by the Green's function of the linear operator describing the dimensionless linearized thin film equation.

Oliver Bäumchen
Max Planck Institute for Dynamics & Self-Organization,
37077 Göttingen, Germany

Date submitted: 12 Nov 2013 Electronic form version 1.4