Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Convergence to Self-Similar Regimes in Thin Polymer Films MICHAEL BENZAQUEN, THOMAS SALEZ, ELIE RAPHAËL, ESPCI, ELIE RAPHAËL TEAM[1], KARI DALNOKI-VERESS TEAM[2] — The surface of a thin liquid film with nonconstant curvature is unstable, as the Laplace pressure drives a flow mediated by viscosity. Recent experiments and theory applied to stepped polymer films have shown excellent agreement and provide a technique for the study of polymer confinement, the glass transition, and slip at the fluid substrate interface to name a few [1]. The thin film equation governs the evolution of the free surface profile in the lubrication approximation. Despite many efforts, this equation remains only partially solved. We present an analytical and numerical study of the thin film equation. Linearising this equation enables us to derive the Green's function of the problem and therefore obtain a complete set of solutions. We show that the solutions of the problem with equilibrium boundary conditions uniformly converge in time towards a first kind self-similar universal attractor. A numerical study enables us to extend our results to the nonlinear thin film equation.

[1] McGraw *et al.* PRL **109** 128303 (2012).

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Date submitted: 12 Nov 2012 Electronic form version 1.4