

Abstract Submitted
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Ultra-fast Thinning of Nanoscale Films by Convection MARKUS ABEL, Potsdam University, MICHAEL WINKLER, Institute for Physics and Astronomy, Potsdam University, Germany, RUMEN KRASSTEV, NMI Natural and Medical Science Institute, Reutlingen, Germany — We present experimental results on flows on very thin, nanometer-scale membranes. More specifically we observe an enormous speed-up of the thinning of a film with surfactants towards its equilibrium of a few nanometers when we drive it thermally by cooling locally on a spot in the upper third of the film. Interesting and beautiful to watch by itself, the thinning of films is one of the most important topics for applications and research: Interfaces in general are important for all two-phase flows, as for colloids, aerosols, droplets, or for the production of ultra-thin materials, etc.. The involved processes are macroscopic in 2 dimensions and at nanometers in the third one. Consequently, the system is just at the edge of the hydrodynamic description; furthermore, the chemical and electrical forces of the surfactant and bulk material become important. We have combined convection with thin films in order to observe the effects of thermal driving on thinning and vice versa. As a result, mixing was observed which does not only accelerate the thinning but changes the thinning law qualitatively from linear to exponential.

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