A NEW LATTICE BOLTZMANN APPROACH TO THIN FILM HYDRODYNAMICS

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We propose a novel approach to the numerical simulation of thin film flows, based on the lattice Boltzmann method [1,2,3]. We outline the basic features of the method and show in which limits the expected thin film equation is recovered. To validate our method we perform several benchmark cases including the evolution of the Rayleigh-Taylor instability, the relaxation of a droplet to its equilibrium contact angle and the sliding of a droplet on an inclined plane. In Fig. 1 we show rendered data of an out of equilibrium droplet. The relaxation follows the predicted behaviour according to the Cox-Voinov law [4], see Fig. 2. Concerning the sliding we observe a linear relation between the capillary and Bond number which is in agreement with theory and experimental observations.

Finally, we will address the effect of thermal fluctuations on thin film dewetting. We will show preliminary results on the early time evolution of the spectrum of height fluctuations in a spinodally dewetting film, and on the morphology of dewetting patterns [5].

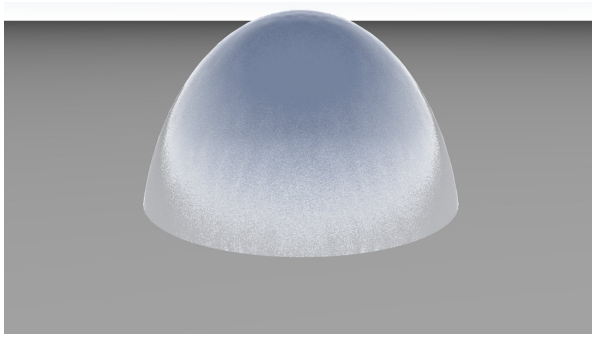

Figure 1. Initial droplet shape, rendered data

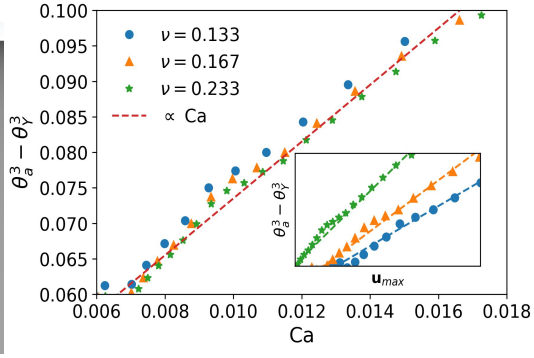

Figure 2. Cox-Voinov spreading law

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