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Collapse of multiple holes in an unbounded liquid film MICHAEL EIGENBROD, STEFFEN HARDT, Institute for Nano- and Microfluidics, TU Darmstadt — We study experimentally and theoretically the collapse of multiple holes in a liquid film. The time evolution of an ensemble of holes is examined using high-speed videomicroscopy and characterized by the time-dependence of the hole shapes. An analytical formula for the potential energy difference between an unbounded liquid film with N holes and a film without holes is derived based on the Young-Laplace equation, accounting for surface tension and gravity. The equation is valid for small solid-liquid contact angles and arbitrary shapes of the three-phase contact line. It is further suggested that the time evolution of a multi-hole arrangement in a highly viscous film can be predicted through steepest descent of the potential energy in a configuration space representing the shapes of the holes. The theoretical model for the time evolution of the system if confirmed by experimental results for the collapse of multiple nearly circular holes.

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