Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Modeling the initial contact line dynamics of dewetting bubbles[1]

MARK MENESSES, MATTHIEU LAURENT, JAMES BIRD, Boston University —
When a rising bubble comes to rest beneath a solid horizontal surface, the resulting liquid film dewets to minimize the total free energy of the three phase system. For partially wetting surfaces, the presence of the contact angle yields dynamics which are assumed to be governed by viscous effects. In contrast, the early-time dynamics for drops spreading on partially wetting surfaces are dominated by inertial effects. Motivated by the discrepancy between these two systems, we conduct experiments on dewetting bubbles and find that the short-time dynamics fail to obey purely viscous or inertial scalings. We draw from previously proposed dewetting and spreading models to develop a new model that can rationalize the anomalous scalings that we observe. Our results suggest that the speed that a bubble adheres to a partially wetting surface is set by an interplay of capillary waves and contact line motion.

[1]We acknowledge support from ONR, Saint-Gobain, and NSF GRFP.

Mark Menesses
Boston University

Date submitted: 29 Jul 2016 Electronic form version 1.4