

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Wetting failure and contact line dynamics in a Couette flow LUCA BIFERALE, MAURO SBRAGAGLIA, University of Rome, Tor Vergata, KAZU SUGIYAMA, University of Tokyo — Liquid-liquid wetting failure is investigated in a two-dimensional Couette system with two immiscible fluids of arbitrary viscosity. The problem is solved exactly using a sharp interface treatment of hydrodynamics (lubrication theory) as a function of the control parameters: capillary number, viscous ratio and separation of scale. The transition at a critical Capillary number, from a stationary to a non-stationary interface, is studied at changing the control parameters. Comparisons with similar existing analysis for other geometries, as for the Landau-Levich problem, are also carried out. A numerical method of analysis is also presented, based on diffuse interface models obtained from multiphase extensions of the lattice Boltzmann equation (LBE). Sharp interface and diffuse interface models are quantitatively compared, face to face, indicating the correct limit of applicability of the diffuse interface models.

Luca Biferale
University of Rome, Tor Vergata

Date submitted: 25 Jul 2008

Electronic form version 1.4