Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

**A scale-dependent model for direct computation of dynamic contact lines** S. ZALESKI, Sorbonne Universites, UPMC Univ Paris 06, CNRS, UMR 7190, France, S. AFKHAMI, New Jersey Institute of Technology, A. GUION, J. BUONGIORNO, Massachusetts Institute of Technology — When using numerical schemes for the simulation of moving contact lines with the classical "no-slip" boundary condition, the numerical solutions become dependent on grid spacing. Numerical approaches that account for the slip of the contact line avoid this difficulty; a numerically feasible slip length however can often be much larger than the physically "true" one. Afkhami et al. [J. Comp. Phys., 228:5370–5389, 2009] addressed this issue, where they proposed a numerical model for the implementation of contact angle based on the mesh size that resulted in mesh independent solutions. Here we refine and apply their numerical observation by studying the problem of coating a plate withdrawn from a viscous liquid reservoir. We consider a partially wetting liquid and show that depending on the capillary number, either a stationary meniscus is formed or a liquid film is deposited on the substrate, known as the transition to a Landau–Levich–Derjaguin film. We derive an effective numerical boundary condition model for the computation of the transition capillary number. The model can be thought of as a large scale solution in an asymptotic matching procedure.

S. Afkhami
New Jersey Institute of Technology

Date submitted: 28 Jul 2016 Electronic form version 1.4