Abstract Submitted
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The inner region of the moving contact line - diffusive and nanoscale models[1] ANDREAS NOLD, Imperial College London, DAVID N. SIBLEY, Loughborough University, BEN D. GODDARD, The University of Edinburgh, SERAFIM KALLIADASIS, Imperial College London — Much of the work within the Complex Multiphase Systems group [1] at Imperial College London for the last number of years has been to understand the moving contact line problem. In [2], it was shown that contrary to the classical asymptotic theory at the moving contact line, the intermediate region is in fact an overlap region between the inner and the outer regions. Here, we investigate the inner region independently for the Navier-Stokes/ Cahn-Hilliard (NS/CH) model for binary fluids, as well as dynamic density functional theory (DDFT) for a simple fluid. We show that in the NS/CH model, the overlap region is recovered in the sharp-interface limit, and we link the slip length to the mobility of the system. In contrast, DDFT, which is based on statistical mechanics of fluids, allows to incorporate nanoscale details. Results are presented for advancing and receding contact lines for a wide range of contact angles. The numerical method employs spectral methods in an unbounded domain along the surface. Advantages are discussed, both for differential and integral DDFT equations. [1] http://www3.imperial.ac.uk/complexmultiphasesystems. [2] Sibley, D.N., Nold, A. and Kalliadasis, S. J. Fluid Mech. 764, 445 (2015).

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