Abstract Submitted
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Numerical simulations of the moving contact line problem using a diffuse-interface model[1] MUHAMMAD AFZAAL, Imperial College London, UK, DAVID SIBLEY, Loughborough University, UK, ANDREW DUNCAN, PETR YATSYSHIN, MIGUEL A. DURAN-OLIVENCIA, ANDREAS NOLD, Imperial College London, UK, NIKOS SAVVA, Cardiff University, UK, MARKUS SCHMUCK, Heriot-Watt University, UK, SERAFIM KALLIADASIS, Imperial College London, UK — Moving contact lines are a ubiquitous phenomenon both in nature and in many modern technologies. One prevalent way of numerically tackling the problem is with diffuse-interface (phase-field) models, where the classical sharp-interface model of continuum mechanics is relaxed to one with a finite thickness fluid-fluid interface, capturing physics from mesoscopic lengthscales. The present work is devoted to the study of the contact line between two fluids confined by two parallel plates, i.e. a dynamically moving meniscus. Our approach is based on a coupled Navier-Stokes/Cahn-Hilliard model. This system of partial differential equations allows a tractable numerical solution to be computed, capturing diffusive and advective effects in a prototypical case study in a finite-element framework. Particular attention is paid to the static and dynamic contact angle of the meniscus advancing or receding between the plates. The results obtained from our approach are compared to the classical sharp-interface model to elicit the importance of considering diffusion and associated effects.

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