Modeling and Simulation of Moving Contact Line Problems for Two-Phase Complex Fluids

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We introduce the sharp interface models for moving contact lines with insoluble surfactants and polymeric fluids. A continuous model with the boundary conditions is derived for the dynamics of two immiscible fluids with moving contact lines and insoluble surfactants based on thermodynamic principles. A finite element numerical method is developed to solve the coupled partial differential equation. We also discuss the model reduction of the slip model to the no-slip limit by the technique of asymptotic analysis.