FM8S_12106

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Level-Set Simulations of Shear Flow with Inertia Pas a Droplet Adhering to a Wall with Moving Contact Lines

Peter D.M. Spelt

Theoretical Mechanics, University of Nottingham, UK

A level-set method for the numerical simulation of incompressible two-phase flow is developed for flows with moving contact lines. The method is used to study shear flow past a two-dimensional droplet that adheres to a solid substrate. Cases with pinned and moving contact lines can be simulated. Previous work on this problem assumed Stokes flow, whereas the present method is suitable for flow with significant Reynolds number. Results were found to agree well with those published previously for creeping flow. The wake formed at intermediate Reynolds numbers is located at some distance behind the droplet, because the fluid rotates in the same direction inside the wake as inside the droplet. If the contact lines are allowed to move, the wake moves with the droplet. Results will be presented for critical dimensionless parameters, beyond which part of the droplet is sheared off.

View the extended summary