

A curvature boundary condition for moving contact line

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Abstract: Effective wall boundary condition is very important for simulating multi-phase flow involving moving contact line. In this paper we present a curvature boundary condition to circumvent the difficulties of previous approaches on explicitly imposing the contact angle and with respect to mass-loss artifacts near the wall boundary. While an effective curvature is imposed directly at the wall surface, based on the asymptotic theory of Cox, the present method does not modify the near-wall interface reconstruction, therefore avoids mass-loss due to the mismatch between physical and numerical contact angles. Test simulations on drop spreading and multi-phase flow in a channel show that, while delivering good agreement with previous studies, the present method achieves grid-convergent results and ensures mass conservation.