A lattice Boltzmann model for multiphase flows with moving contact line and variable density

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In this talk, we introduce an efficient lattice Boltzmann model for the two-phase moving contact line problem with variable density. The Navier–Stokes and Cahn–Hilliard equations are recovered from the lattice Boltzmann model. To improve numerical stability, we present a semi-implicit lattice Boltzmann method together with a mixed finite difference scheme. In order to describe the behavior of the contact line motion on the boundary, we incorporate the generalized Navier boundary condition by the nonequilibrium extrapolation method. The proposed method is easy to implement and retains the advantage of the standard lattice Boltzmann method. Numerical tests are carried out to verify the proposed method. Our numerical results show that the present approach is able to model two-phase flows with variable density and moving contact line.