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Lattice Boltzmann Method for Interfacial Flows with High Density Ratio JIANGHUI CHAO, YANXIA ZHAO, RENWEI MEI, WEI SHYY, University of Florida — A computational model using Lattice Boltzmann Equation (LBE) method for two-phase flow with sharp interface and high density ratio is developed. The Lattice Boltzmann scheme simulates incompressible two-phase flow by solving two distribution functions simultaneously. The interfacial dynamics are modeled by incorporating the intermolecular interaction force (He et al., JCP, pp642-663, 1999). By using a new surface tension formulation to eliminate oscillations in surface tension profile, numerical stability is significantly improved. Sharp interface can be maintained for flows with density ratio at $O(10^2)$ or higher with little oscillation in velocity and pressure across interface. The detailed numerical assessment on the performance of the scheme based on the simulations of static bubble and rising bubble will be presented. The motion of a droplet on a wall is also studied using this improved method. The wetting boundary conditions on the wall are implemented to minimize the total free energy of the system. The motion of contact line, the contact angle, the surface tension, the velocity field and the pressure distribution are analyzed.

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