

CHAN-HILLIARD EQUATION BASED LATTICE BOLTZMANN SIMULATIONS OF TWO-PHASE FLOW

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Lattice Boltzmann method has achieved great success in binary flow problems because the advantages to adopting this method are it is explicit, easy to implement and natural to parallelize. By solving a set of Navier-Stokes equation coupled with Cahn-Hilliard equation to track the interface, a droplet resting on micro structure surface [1] and splashing on a thin film will be demonstrated. To simulate a three-dimensional liquid droplet resting on micro-structures surface at different roughness, a high density model of Zheng et al [2] combined with partial wetting boundary method proposed by Briant et al. [3] is adopted. Water droplet rests on hydrophobic surfaces exhibits a high contact angle, and surface hydrophobicity can be further enhanced by the presence of surface roughness, which can be created by micro geometric structure on surface. Further, a stable Lattice Boltzmann discretization scheme incorporating the Cahn-Hilliard equation proposed by Lee et al. [4] is adopted to simulate a splashing droplet.

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