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Lattice Boltzmann Simulations of Finite-Sized Particles in Interfaces KEVIN CONNINGTON, The Levich Institute, The City College of New York, TAEHUN LEE, Mechanical Engineering, The City College of New York, JEFF MORRIS, The Levich Institute, The City College of New York — The presence of solid particles can play an important role in many multiphase/multi-component flows. For example, particles in the interface of an emulsion can act to stabilize the drop, preventing breakup. We extend an existing free energy-based multi-component Lattice Boltzmann Method (LBM) to handle the transport of immersed solid particles of a finite size. The multi-component LBM can simulate the property differences encountered in a water-air system while eliminating the unwanted phenomenon of spurious currents at equilibrium. The particles are transported by the fluid according to Newtonian dynamics. The total force on a particle is computed by Momentum Exchange (ME), as in single phase flow. However, we introduce a supplemental term to account for the force of the interface on the particle. We validate the inclusion of this forcing term, and demonstrate the capability of the code by performing simulations of drop impact with immersed solid particles and the rupture of a liquid bridge containing particles.

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