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Simulation of the Dynamics of Bubble Rising in viscous fluid using Lattice Boltzmann Equation Method LUZ AMAYA-BOWER, City College and Graduate Center of City University of New York, TAEHUN LEE, City College of City University of New York — A stable Lattice Boltzmann Equation (LBE) Model based on the Cahn-Hilliard diffuse interface approach is presented for simulation of incompressible two-phase flows having large density and viscosity ratios. This model utilizes two particle distribution functions which recover the evolution of composition, pressure and momentum. This model is validated by analyzing the dynamics of a single rising gas bubble in viscous fluid. Terminal shape and Reynolds number (Re) are interactive quantities that depend on size of bubble, surface tension, viscosity and density of surrounding fluid. Accurate simulation of terminal shape and Re are obtained for different regimes. The regimes achieved were spherical, ellipsoidal, skirted and spherical cap. These were successfully achieved by systematically changing the values of Morton number (Mo) and Bond number (Bo) within the following ranges ($10^{-12} < \mathrm{Mo} < 10^{6}$) and ($1 < \mathrm{Bo} < 10^{3}$). Re and final bubble shape for each regime could be satisfactorily predicted and simulated since they are also function of Morton and Bond number. Re results are compared with previous simulation and experimental results.

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