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Modelling of Dispersed Gas-Liquid Flow using LBGK and LPT Approach[1] ALANKAR AGARWAL, Indian Institute of Technology Jodhpur, Rajasthan, India-342037, AKSHAY PRAKASH, Indian Institute of Technology Kharagpur, West Bengal-721302, B. RAVINDRA, Indian Institute of Technology Jodhpur, Rajasthan, India-342037 — The dynamics of gas bubbles play a significant, if not crucial, role in a large variety of industrial process that involves using reactors. Many of these processes are still not well understood in terms of optimal scale-up strategies.An accurate modeling of bubbles and bubble swarms become important for high fidelity bioreactor simulations. This study is a part of the development of robust bubble fluid interaction modules for simulation of industrial-scale reactors. The work presents the simulation of a single bubble rising in a quiescent water tank using current models presented in the literature for bubble-fluid interaction. In this multiphase benchmark problem, the continuous phase (water) is discretized using the Lattice Bhatnagar-Gross and Krook (LBGK) model of Lattice Boltzmann Method (LBM), while the dispersed gas phase (i.e. air-bubble) modeled with the Lagrangian particle tracking (LPT) approach. The cheap clipped fourth order polynomial function is used to model the interaction between two phases. The model is validated by comparing the simulation results for terminal velocity of a bubble at varying bubble diameter and the influence of bubble motion in liquid velocity with the theoretical and previously available experimental data.

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