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An arbitrary-Lagrangian-Eulerian method for simulating particle-bubble interactions TONG QIN, PENGTAO YUE, SAAD RAGAB, Virginia Tech — Particle-bubble interaction is an important process in flotation. This problem is difficult in that it involves three phases: solid particles, gas bubbles, and surrounding liquid. In this work, an arbitrary-Lagrangian-Eulerian (ALE) approach is developed for the direct numerical simulation. A moving triangular mesh is used to track the surfaces of rigid solid particles and deformable gas bubbles. The gas motion inside each bubble is neglected, and the pressure is determined by the isothermal gas law. The equations for the particle motion and the Navier-Stokes equations for the liquid motion are solved in a unified finite element framework. The whole system is solved by an implicit scheme which is second order in time. In the end, we will show results on the head-on collision between a bubble and a particle and the subsequent film drainage process. Depending on the collision conditions, the particle may attach to the bubble or be bounced back. Comparisons with experiments will also be presented.

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