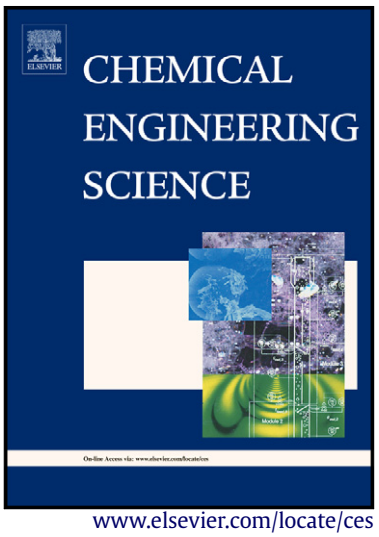

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Spherical Bubble Dynamics in a Bubbly Medium using an Euler-Lagrange Model

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Abstract

For applications involving large bubble volume changes such as in cavitating flows and in bubbly two-phase flows involving shock and pressure wave propagation, the dynamics, relative motion, deformation, and interaction of bubbles with the surrounding medium play crucial roles and require accurate modeling. We present in this paper a fundamental study of the dynamic oscillations of a 'primary' bubble in a bubbly mixture using a two-way coupled Euler-Lagrange model. It addresses a simplified spherical configuration while using the full three-dimensional code. A main objective of the study is to investigate how the dynamics of a 'primary' bubble is affected by the presence of a surrounding bubbly medium and how it differs from its behavior in a pure liquid. This helps elucidate the physics at play for this relatively simple configuration. The model simulates the mixture as a continuum and solves the corresponding Navier Stokes equations with grids moving with the interface of the primary bubble wall. The surrounding microbubbles are tracked in a Lagrangian fashion accounting for their volume evolution. The two-way coupling between the bubbly medium and the primary