

A boundary element method for the simulation of non-spherical bubbles and their interactions near a free surface

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Abstract

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Abstract The basic principle and numerical technique for simulating two three-dimensional bubbles near a free surface are studied in detail by using boundary element method. The singularities of influence coefficient matrix are eliminated using coordinate transformation and so-called π rule. The solid angle for the open surface is treated in direct method based on its definition. Several kinds of configurations for the bubbles and free surface have been investigated. The pressure contours during the evolution of bubbles are obtained in our model and can better illuminate the mechanism underlying the motions of bubbles and free surface. The bubble dynamics and their interactions have close relation with the standoff distances, buoyancy parameters and initial sizes of bubbles. Completely different bubble shapes, free surface motions, jetting patterns and pressure distributions under different parameters can be observed in our model, as demonstrated in our calculation results.

Keywords: boundary element method singularities solid angle bubble jetting.

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