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Numerical analysis of bubble-cluster formation in an ultrasonic field[1] DONGHYUN KIM, GIHUN SON, Sogang Univ — Bubble-cluster formation in an ultrasonic field is investigated numerically solving the conservation equations of mass, momentum and energy. The liquid-gas interface is calculated using the volume-of-fluid method with variable gas density to consider the bubble compressibility. The effect of liquid-gas phase change is also included as the interface source terms of the mass and energy equations. The numerical approach is tested through the simulation of the expansion and contraction motion of a compressed bubble adjacent to a wall. When the bubble is placed in an ultrasonic field, it oscillates radially and then collapses violently. Numerical simulation is also performed for bubble-cluster formation induced by an ultrasonic generator, where the generated bubbles are merged into a macrostructure along the acoustic flow field. The effects of ultrasonic power and frequency, liquid properties and pool temperature on the bubble-cluster formation are investigated.

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