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Numerical simulation of compressible bubble motion with phase change GIHUN SON, SUNGWOOK CHO, Sogang Univ — Numerical simulation is performed for bubble motion under a pressure wave condition, which receives increasing attention in medical therapy and targeted drug delivery. The level-set method for incompressible two-phase flows is extended to include the effect of liquid and vapor compressibility as well as the effect of phase change by incorporating the ghost fluid method to efficiently implement the matching conditions of velocity, stress and temperature at the interface. The semi-implicit pressure correction formulation is implemented into the level-set method to avoid the serious time step restriction in weakly compressible flows. The numerical results for 1-D compressible flows show good agreement with the analytical solutions. The computation of bubble motion under a periodic pressure wave condition demonstrates that the bubble in a compressible liquid significantly amplify the incoming wave at the resonance condition and builds up the liquid pressure to a very high level. The computation of vapor bubble motion in a subcooled liquid shows that the condensation heat transfer to the colder liquid causes very rapid bubble collapse and strong pressure wave propagation. The effects of pressure amplitude and ambient temperature on the bubble motion are investigated.

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