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Modeling bubble clusters in compressible liquids DANIEL FUSTER, TIM COLONIUS, California Institute of Technology — We present a new model to simulate the behaviour of bubble clouds in compressible liquids. The method uses a volume-averaged approach and defines the pressure and void fraction relative to a computational cell. Inside the cell, a generalisation of the Keller-Miksis equation is derived in order to take into account the presence of (one or more) nearby spherical bubbles as well as liquid compressibility effect on the bubble interface motion. The method converges to previous models in two distinct limits. First, it reproduces the bubble radius evolution and pressure disturbances induced by a single bubble subjected to a given far field pressure, irrespective of the relative size of the bubble compared to the grid size. Second, it converges to continuum models based on Ensemble-averaged equations when there are many bubbles in a cell. The main advantage of the model is that it allows to access to the instantaneous pressure profiles in the liquid rather than the averaged behaviour. The local pressures generated and scattered by bubble dynamics is important for predicting the peak pressures that can be locally achieved in some points of the liquid when violent bubble collapses are encountered.

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