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Interaction of gas bubbles with a shock wave near a solid boundary[1] STEPHEN SHAW, PETER SPELT, OMAR MATAR, Imperial College London — The interaction of both single and multiple gas bubbles in water with an initially planar shock in the neighbourhood of a solid boundary is considered. The compressible Euler equations in each phase are solved in axisymmetric and 3-D Cartesian geometry using up to a third-order accurate ENO-Roe scheme for the spatial fluxes in characteristics space; the solutions are evolved temporally using a third-order accurate TVD RK method. The interface between the water and gas phases is tracked with a level set function and interfacial boundary conditions are imposed using the Ghost Fluid method. The solid boundary is captured by employing reflection computational boundary conditions. In the case of a single bubble, the effect of the shock strength and of the initial location of the bubble relative to the boundary on the resultant bubble shapes, liquid jet shapes and velocities is assessed. The importance of the shock wave reflection from the boundary on the resultant dynamics is studied, together with incurred modifications due to bubble multiplicity. This work has applications in shock wave lithotripsy, cavitation-induced damage and surface cleaning.

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