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Fluid-structure interaction of converging shocks in water[1]
VERONICA ELIASSON, California Institute of Technology, WILLIAM D. HENSHAW, Lawrence Livermore National Laboratory, ARES J. ROSAKIS, PAUL E. DIMOTAKIS, California Institute of Technology — Numerical simulations of shock focusing in a convergent water-filled geometry with various types of elastic solids (rubber, plastic and metal) as the surrounding material have been performed. The fluid deforms the solid, generating elastic waves, which in turn affect the liquid; thus creating a coupled fluid-structure problem. Here, we use the Overture suit, a code for solving partial differential equations on curvilinear overlapping grids using adaptive mesh refinement. The Euler equations with a stiffened equation of state are used in the fluid domain and linear elasticity is assumed in the solid domain. Preliminary results indicate that the wave speed of the material has a significant influence on the behavior of the converging shock. Comparisons between numerical and experimental results are presented and have the potential to aid in the design of marine structures with convergent sections subjected to dynamic loading events.

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