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Shock wave dynamics in a water-filled log-spiral duct[1] CHUANXI WANG, VERONICA ELIASSON, University of Southern California — Both numerical simulations and experiments of converging shock waves in a water-filled log-spiral duct have been performed. A log-spiral shape is considered as one of the "worst-case scenarios," because this particular shape minimizes reflections from the surrounding walls. The simulations were performed using the Overture suite, a package for solving partial differential equations on curvilinear overlapping grids using adaptive mesh refinement. A coupled fluid-solid solver was used to simulate both the water and the surrounding solid domains. Results show that the fluid-structure interaction indeed changes the shock dynamics as compared to using fluid domain with rigid boundary conditions. In the experiments, a projectile from a gas gun impacts the water-filled sample and generates a shock wave, which is then captured by a high-speed schlieren system. Comparison between the experiments and the simulations will be presented, and the results can benefit the design of marine structures with converging sections subjected to dynamic loading events.

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