

Abstract Submitted
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Experiments and simulations of shock focusing in thin water-filled convergent structures¹ VERONICA ELIASSON, CHUANXI WANG, SHI QIU, University of Southern California — A shock wave generated by an underwater explosion will impact any nearby surrounding structure and the fluid-structure interaction during the shock impact has to be understood to keep the structure safe from damage. Extremely high pressures will be generated, and the time of impact is on the order of a few milliseconds. In this work, the fluid-structure interaction during shock wave impact on water-filled convergent structures is studied extensively to assess the strength and dynamical response of the surrounding structure to lead to viable future design considerations to minimize or avoid damage. The response of light-weight composite materials are compared to that of steel structures. Experiments using high-speed non-invasive schlieren techniques and finite element numerical simulations have been performed. Results show that the fluid-structure interaction during shock impact is highly dependent on the thickness and material properties of the surrounding convergent structure. Precursor waves in the water ahead of the incident shock wave behave differently from case to case, and will be addressed in this presentation.

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