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Fluid-structure interaction (FSI) of Wedge Drop Slamming LIANXIA LI, MARK FENN, MAYSAM MOUSAVIRAAD, University of Wyoming, CHRISTINE GILBERT, Virginia Tech — Fluid-structure interaction (FSI) problems are complex in nature, especially when the loading by the fluid is unpredictable and impulsive or when the material properties of the structure are nonlinear or otherwise complex. The purpose of this study is to investigate the water impact hydrodynamics/hydro-elasticity of flexible bodies through computational and experimental methods. Computational FSI capability is developed at University of Wyoming based on a two-way coupled approach. The flow is resolved by URANS CFD modeling and non-linear FEM equations are employed for structural dynamics. Slamming experiments are carried out at Virginia Tech for a 20deadrise angle aluminum wedge with a bottom plate thickness of 3.175 mm and drop heights ranging from 0.9 to 38.1 cm. Measurements include time histories of vertical position, acceleration, pressure, and strain. Strain measurements are taken at single points using strain gauges as well as full-field measurements of all strain components and out-of-plane deflection using stereoscopic digital image correlation (S-DIC). Computational studies include validation and investigations of the physics involved in the interactions. Next step will extend to highly flexible structures where the two-way nonlinear interactions are more significant.

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