Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

A Mitigation Scheme for Underwater Blast: Experiments and Modeling LEE GLASCOE, LARRY MCMICHAEL, KEVIN VANDERSALL, JON MARGRAF, LLNL — A novel but relatively easy-to-implement mitigation concept to enforce standoff distance and reduce shock loading on a vertical, partially-submerged structure is evaluated experimentally using scaled aquarium experiments and numerically using a high-fidelity finite element code. Scaled, water-tamped explosive experiments were performed using aquariums of two different sizes. The effectiveness of different mitigation configurations, including air-filled media and an air gap, is assessed relative to an unmitigated detonation using the same charge weight and standoff distance. Experiments using an air-filled media mitigation concept were found to effectively dampen the explosive response of an aluminum plate and reduce the final displacement at plate center by approximately half; an experiment using an air-gap alone resulted in a focused water jet. The finite element model used for the initial experimental design compares very well to the experimental DIC results both spatially and temporally. Details of the experiment and the finite element models of the aquarium, as well as a larger hypothetical structure, are described including the boundary conditions, numerical techniques, detonation models, experimental design and test diagnostics. This work was performed under the auspices of the US DOE by LLNL under Contract DE-AC52-07NA27344. We would like to thank DHS S&T Directorate for support and assistance.

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Date submitted: 23 Feb 2011 Electronic form version 1.4