Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Numerical predictions of shock propagation through unreactive and reactive liquids with experimental validation SVJETLANA STEKOVIC, ERIN NISSEN, MITHUN BHOWMICK, DONALD S STEWART, DANA D DLOTT, University of Illinois at Urbana-Champaign — The objective of this work is to numerically analyze shock behavior as it propagates through compressed, unreactive and reactive liquid, such as liquid water and liquid nitromethane. Parameters, such as pressure and density, are analyzed using the Mie-Gruneisen EOS and each multi-material system is modeled using the ALE3D software. The motivation for this study is based on provided high-resolution, optical interferometer (PDV) and optical pyrometer measurements. In the experimental set-up, a liquid is placed between an Al 1100 plate and Pyrex BK-7 glass. A laser-driven Al 1100 flyer impacts the plate, causing the liquid to be highly compressed. The numerical model investigates the influence of the high pressure, shock-compressed behavior in each liquid, the energy transfer, and the wave impedance at the interface of each material in contact. The numerical results using ALE3D will be validated by experimental data. This work aims to provide further understanding of shock-compressed behavior and how the shock influences phase transition in each liquid.

Svjetlana Stekovic
University of Illinois at Urbana-Champaign

Date submitted: 24 Feb 2017 Electronic form version 1.4