Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Blast Loading Experiments of Developed Surrogate Models for TBI Scenarios MATTHEW ALLEY, STEVEN SON, Purdue University — This study aims to characterize the interaction of explosive blast waves through simulated anatomical systems. We have developed physical models and a systematic approach for testing traumatic brain injury (TBI) mechanisms and occurrences. A simplified series of models consisting of spherical PMMA shells followed by SLA prototyped skulls housing synthetic gelatins as brain simulants have been utilized. A series of experiments was conducted with the simple geometries to compare the sensitivity of the system response to mechanical properties of the simulants under high strain-rate explosive blasts. Small explosive charges were directed at the models to produce a realistic blast wave in a scaled laboratory setting. Blast profiles were measured and analyzed to compare system response severity. High-speed shadowgraph imaging captured blast wave interaction with the head model while particle tracking captured internal response for displacement and strain correlation. The results suggest amplification of shock waves inside the head due to impedance mismatches. Results from the strain correlations added to the theory of internal shearing between tissues.

Matthew Alley
Purdue University

Date submitted: 20 Feb 2009 Electronic form version 1.4