Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Novel measurements of shock pressure decay in PMMA using detonator loading MICHAEL MURPHY, MARK LIEBER, MATTHEW BISS, Los Alamos National Laboratory — An empirical model equation for shock pressure decay in PMMA was determined through a unique set of experiments employing detonator loading. Custom polymethyl methacrylate (PMMA) witness blocks were designed with monolithic architecture to house precise PMMA gap thicknesses ranging from 0-10 mm in 1 mm increments. The PMMA gaps separated detonator working surfaces from windowed photonic Doppler velocimetry (PDV) probes, and were designed to provide undistorted optical access to ultra-high-speed framing and digital streak cameras. The shock wave image framing technique (SWIFT), and a new laser-backlit digital streak diagnostic, simultaneously captured the temporal evolution of detonator-induced diverging shock waves within the PMMA gaps. The PDV diagnostic measured critical mass velocity histories as the shocks exited the variable gap thicknesses. The multi-diagnostic data package was used to characterize the shock pressure decay in PMMA as a function of shock propagation time and PMMA thickness.

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Date submitted: 24 Feb 2017 Electronic form version 1.4