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Front surface impact experiments using multiple windows for unreacted Hugoniot measurements of high explosives formulations ADAM PACHECO, CINDY BOLME, ADAM GOLDER, CLAUDINE ARMENTA, RAMON SAAVEDRA, JOHN LAZARZ, ERNEST HARTLINE, GARY WINDLER, KYLE RAMOS, Los Alamos National Laboratory, HE CRYSTAL LAB TEAM
— During development and evaluation of new high explosive formulations, reactant Hugoniots must be measured to ascertain the impact pressure for Pop-plots by impedance matching. To be able to compare and contrast formulations with slight composition changes, the impact pressures and hence the Hugoniots must be measured precisely. This is both a costly and technically challenging endeavor that must be expedited to inform formulation efforts. Toward this objective, a front surface impact experiment has been developed and evaluated. Typical Hugoniot determinations require 3-4 separate transmission-type experiments. However, reactant Hugoniots from transmission type experiments can be error prone as chemical reactions contribute to particle velocity. Front surface impacts are an obvious solution and are typically made with embedded magnetic velocity gauges, for example. However, this approach still requires multiple experiments. As an alternative, a multiwindow target consisting of LiF, PMMA, quartz and sapphire was built and the explosive impacted into it using a single stage gas gun. The methodology for construction and metrology of the window and the resulting Hugoniot data will be presented for HMX-based formulations with varying amounts of nitroplasticized Estane binder.

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