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Laboratory-scale experiments to determine explosive properties using spherical concentric composite explosives MATTHEW BISS, GARY SETTLES, Penn State University — Laboratory-scale air-blast experiments using gram-range composite explosive charges are presented. Composite charges consist of a spherical booster charge surrounded by a concentric spherical "candidate material" charge in the form of a shell. Air-blast explosive tests are conducted to measure the radius vs. time of the explosively-driven shock wave using digital high-speed shadowgraphy. Profiles of peak shock wave pressure vs. radius are then found using the Rankine-Hugoniot relationship for both the booster alone and the composite charges. Using calculated peak shock wave pressures, a procedure is developed to remove the booster effects from the signature produced by the composite charge, yielding the peak shock wave pressure effect due to the candidate explosive material alone. By this means we demonstrate the ability to properly characterize, at the laboratory scale with a few grams of explosive, insensitive explosive materials that require a booster charge for detonation. This characterization yields TNT equivalence and other useful explosive properties.

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