Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Explosive acceleration of plates using nonconventional explosives heavily loaded with inert and reactive materials JASON LOISEAU, OREN PETEL, JUSTIN HUNEAULT, MATTHEW SERGE, DAVID FROST, ANDREW HIGGINS, McGill University, Mechanical Engineering Dept., 817 Sherbrooke St. W., Montreal, Quebec, H3A 2K6, Canada — The detonation behavior of high explosives containing dispersed quantities or packed beds of dense additives has been previously investigated with the observation that such systems depart from the "gamma law" behavior typical of homogeneous explosives due to momentum transfer and thermalization between particles and detonation products. However, the influence of this non-ideal detonation behavior on the divergence speed of plates has been far less rigorously studied and existing literature suggests that the effect of dense additives cannot be explained solely through the straightforward application of the Gurney method with energy and density averaging of the explosive. In the current study, the acceleration history and terminal velocity of aluminum flyers launched by packed beds of granular material saturated by amine-sensitized nitromethane is reported. Two experimental configurations are used to study acceleration either by a purely grazing detonation in a finite thickness slab of explosive or by a normal detonation from an effectively infinite thickness of explosive. Flyer acceleration and velocity is measured via Photonic Doppler Velocimetry. Packed beds of plastic, aluminum, glass, iron, and bismuth are considered and the data is compared to Gurney velocity predictions.

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Date submitted: 25 Feb 2013 Electronic form version 1.4