Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

The Dynamic Response of Energetic Formulations to Embedded Voids. GREGG GLENN, HORIE YASUYUKI, MICHAEL GUNGER, APS member — Programs are underway at AFRL and other labs to investigate the phenomenology of the response of energetic materials to long duration (>1 ms) loading environments. As part of these efforts, the effect of a defect, primarily in the form of a void, is the focus of the investigation. This paper will present a combined test and analytical study of multiple composite energetic formulations and will include a significant amount of test data. The primary variables associated with the loading environment are pressure, duration and loading rate. The energetic formulations primarily consist of ammonium perchlorate (AP), RDX, aluminum flake and HTPB binder. Void size and peak pressure were varied to determine safe loading margins. Post-test observations of reacted material were performed using a scanning electron microscope (SEM) to determine damage, crystal response and reaction locations within the sample. X-ray analysis was performed on unreacted samples to compare with reacted samples. The results are providing critical information on the sensitivity of an explosive formulation to void compression as a function of formulation, loading rate, peak pressure and duration. The results of these tests can be used in simulations to develop an improved understanding of mechanical and thermal initiation of energetic materials.

Michael Gunger
APS member

Date submitted: 23 Jan 2007 Electronic form version 1.4