CHARACTERIZATION FOR SUB-FRAGMENTATION OF REACTIVE FRAGMENTS DURING PERFORATION

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ABSTRACT

Structural reactive material (SRM) fragments exhibit rapid energy release during impact and perforation of target structures. A barrel-shaped chamber with a nominal 100-L volume was designed with heavy cylindrical side walls and replaceable circular perforation witness plates to quantify the secondary fragmentation and combustion of explosively-dispersed primary SRM fragments. Analyses were carried out to quantify the perforation and internal combustion effect of an ensemble of incoming naturally-formed reactive metal fragments, in combination with fragment size distribution, internal pressure, and temperature records. The secondary fragmentation and combustion diagnostic was successful at discerning the enhanced target effects between two similar SRM casing trials. The present experimental results were used to extend macroscopic physical models for SRM fragments, including models for ballistic limit velocity, residual velocity after perforation, secondary fragmentation size distribution, and combustion and venting rates.