

Abstract Submitted
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Sub-fragmentation of structural-reactive-material casings under explosion¹ FAN ZHANG, Defence Research and Development Canada — The sub-fragmentation of structural reactive material (SRM) thick-casings is to generate fine fragments during casing fragmentation under explosive loading for their efficient energy release to enhance air blast. This has been investigated using a cylindrical casing made from either rich Al-MoO₃ or Al-W-based granular composites. The former composite was to study the concept of reactive hot spots where the reaction of reactive particles, which were distributed into base SRM in a fuel-rich equivalence ratio, created heat and gas products during SRM fragmentation. The expansion of these distributed hot spots initiated local fractures of the casing, leading to fine fragments. The Al-W-based composite investigated the concept of impedance mismatch, where shock dynamics at the interfaces of different impedance ingredients resulted in non-uniform, high local temperatures and stresses and late in times the dissimilar inertia resulted in different accelerations, leading to material separation and fine fragments. The casings were manufactured through both hot iso-static pressing and cold gas dynamic spray deposition. Explosion experiments were conducted in a 3 m diameter, 23 m³ cylindrical chamber for these cased charges in a casing-to-explosive mass ratio of 1.75. The results demonstrated the presence of fine fragments and more efficient fragment combustion, compared with previous results, and indicated the effectiveness of both concepts.

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