INFLUENCE OF BLAST PROPAGATION ON MULTIPHASE EXPLOSION MITIGATING MATERIAL

C. Breda[1], M.-O. Sturtzer[1], S. Kerampran[2], J.-F. Legendre[1]

[1]ISL, French German Research Institute of Saint Louis, 5 rue du General Cassagnou, F-68301 SAINT LOUIS, France
[2]ENSTA Bretagne, LBMS, Laboratory of Brest and Mechanical Systems, 2 rue François Verny, F-29200 BREST, France

ABSTRACT

Aqueous foam represents an interesting blast mitigation material due to its ease of production and neutralization, its low sound velocity in comparison to air and water, its energy absorption ability through bubble compaction and its low shock reflectivity. Depending on the shock intensity, the relative importance of each of these parameters may significantly vary. For this study, ISL focused on the effects of a 1.4kg reference C-4 charge generating blast and metal fragments. In the first study, the resulting blast wave propagation is studied in a large volume of foam covering an explosive charge placed on the ground. The objective is to characterize the structure of the shock wave propagating through the foam volume. The second part of the study focuses on the interaction between a single fragment and a 1.5m thick foam layer. Drag coefficient of foam is determined using a novel experimental facility to track the fragment trajectory in the multiphase medium. Drag coefficients are compared for intact and pre-shocked foam: in close range, blast wave travels in front of explosively projected fragments, altering the foam ability to absorb their kinetic energy. Previsions on blast and fragment trajectories are compared to experimental results to provide guidelines for future applications.