INFLUENCE OF PHYSICAL PROPERTIES OF DRY AQUEOUS FOAMS ON THE MITIGATION OF BLAST WAVES

E. Del Prete[1], A. Chinnayya[2], L. Domergue[1], N. Rambert[1], J.-F. Haas[1], A. Hadjadj[2]

[1]CEA DAM Ile de France, Arpajon, 91290, France
[2]CORIA CNRS UMR 6614, Site Universitaire du Madrillet, Saint-Etienne du Rouvray, 76800, France

Key Words : Blast Waves – Mitigation – Aqueous Foams

This paper presents results of experiments and numerical modeling on the mitigation of blast waves by using dry aqueous foams. The multiphase formalism is used to model the interphase interactions of the liquid phase with the gaseous phase, as well as the interaction of the high explosive with the two-phase medium. New experiments have been performed in order to investigate the influence of the physical properties of dry aqueous foam, such as the liquid volume fraction, the bubble size and the viscosity of the surfactant on the mitigation properties of the aqueous foam. Attenuation is explored through peak overpressures and positive impulses.
It is found that the attenuation depends mainly on the overall liquid content. The expansion ratio is the most predominating parameter. The smaller it is, the more effective will be the attenuation. Then, the increase of the viscosity does not change the overpressure reduction but decreases the impulse reduction. To a lesser extent, smaller bubbles are more efficient close to the charge and less efficient far from the high explosive.