EXPERIMENTAL STUDY OF ALUMINIUM PARTICLES DISPERSED AND IGNITED BY HIGH EXPLOSIVE

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To understand the effects generated by thermobaric explosives, ISL is investigating heterogeneous charges containing high proportions of aluminium particles. Due to the delayed ignition of metal particles, blast characteristics are modified in comparison with homogeneous explosives. Since interactions between the explosion and the metal particles combustion are still not fully understood, different studies were recently conducted at ISL. Charges presented in this paper consist of a high explosive spherical booster surrounded by a layer of metal particles. Background Oriented Schlieren (BOS) method was used for the first time at ISL in 2009 to visualize the expansion of glass and aluminium particles. One of the encountered issues was the lack of luminosity for the large or inert particles, leading to a limited amount of usable data. A new technique of pyrotechnic lighting was consequently developed to provide a stable illumination of the expansion cloud and a full record of the particle flight. In previous experiments, wax blocks were placed around the charges to collect samples of the projected materials. While giving useful information on the nature of the flying agglomerates, this method did not give any indication on their relative arrival times. By installing a rotating disk equipped with a slit in front of a wax block and synchronizing the frequency on the explosion, we realized a time-resolved collection of the explosion products. This paper describes the first results obtained using these new techniques of investigation on the explosion-driven dispersion of particles.