

EXPERIMENTAL STUDY OF EXPLOSIVELY DISPERSED AND IGNITED METAL PARTICLES

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Heterogeneous blast generated by highly metallized explosive compositions is being investigated at ISL since 2004. The mechanism ruling multiphase explosions is critical to understand thermobaric blast effects based on the delayed combustion reactions of metal particles. Reference explosive charges designed specifically for this study consist of a spherical central core of high explosive surrounded by a layer of particles. In a previous document, we presented the first crossed results between time resolved particle capture and optical detection of agglomerates, allowing us to improve the knowledge of the relative arrival time and duration for the different projected material types. However, the limited number of dispersions available at that time prevented us from analyzing the consistency of the captures, especially taking into account the non-uniformity of the projected material distribution. This document presents a large comparison of data collected for different metallic particle types. Influence of particle physical properties on pressure distribution and dispersion is being analyzed. Results are compared to inert material reference charges in order to assess the blast enhancement generated by combustion reactions. The presence of an air gap between the explosive core surface and the particle layer internal surface (with a constant total mass of particles) is also investigated as well as its influence on the dynamic behavior of the explosive dispersion.