

CONFINED EXPLOSIONS OF LAYERED THERMOBARIC CHARGES

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The confined explosion of an annular layered charges composed of a plegmatised RDX (RDXph) core and an external layer consisting of aluminium powder (Al) or a mixture of ammonium perchlorate (AP) and Al was studied. Experiments were carried out in fully and partially closed structures, i.e., in the explosion chamber of 150 dm³ in volume and in the 40 m³ volume bunker with four small holes and a doorway. Charges containing about 21 g of RDXph and about 40 g of a AP/Al mixture were tested in the chamber, which was filled with air or argon. The RDXph core weighed about 110 or 190 g and the external layer weighed about 140 or 280 g, respectively, composed charges, which were fired in the bunker. AP/Al mass ratio was 25/75 or 50/50. Two types of aluminium powder were used in the mixtures. Signals of overpressure from two piezoelectric gauges located at the chamber wall were recorded and the influence of aluminium contents and particle size on a quasi-static pressure (QSP) was studied. Moreover, the solid residues from the chamber were analyzed to determine their composition. TG/DTA and XRD techniques were used. Pressure and light histories recorded in the bunker enable us to determine the blast wave characteristics and time-duration of light output. The effect of the charge mass and aluminium particle size on blast wave parameters were investigated. For comparison, the test for RDXph and TNT charges were also carried out.