SECONDARY SHOCK DELAY MEASUREMENTS FROM EXPLOSIVE TRIALS

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ABSTRACT

Following detonation of an explosive material, a series of rarefaction expansion waves collapse inwards from the interface between the explosive and the surrounding air. These rarefaction waves coalesce at the centre of the explosive and reflect as a shock wave. Whilst these successive shocks are small in magnitude compared to the primary shock and are often ignored, the inward reflected shock immediately following the primary shock wave, typically referred to as the 'secondary shock', is a noticeable feature on blast pressure histories and usually arrives after the beginning of the negative phase.

This paper presents results from medium and large scale surface blast tests where accurate measurements of secondary shock delay (time after arrival of the primary shock) are obtained for various explosives at various scaled distances. A method is presented for adjusting the secondary shock delay time by the product of the velocity of detonation divided by the cube-root of the packing density of the explosive. The relationship between this new secondary shock delay parameter and scaled distance is then found to be consistent for all explosives considered. This gives a new empirical method for estimating the yield of an explosive, or determining the velocity of detonation, based only on measurements of the secondary shock delay.