EXPERIMENTAL STUDIES OF THE EFFECT OF RAPID AFTERBURN ON SHOCK DEVELOPMENT OF NEAR-FIELD EXPLOSIONS

A Tyas[1,2*], JJ Reay[2], SD Fay[1,2], SD Clarke[1], SE Rigby[1], JA Warren[1,2] & DJ Pope[3]

[1]University of Sheffield, Department of Civil & Structural Engineering, Sir Frederick Mappin Building, Mappin Street, Sheffield, S1 3JD, UK.
[2]Blastech Ltd., The BioIncubator, 40 Leavygreave Road, Sheffield, S3 7RD, UK.
[3]Defence Science and Technology Laboratory (Dstl), Porton Down, Salisbury, Wiltshire, SP4 0JQ, UK.
[*]a.tyas@sheffield.ac.uk

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Many conventional high explosives do not contain sufficient internal oxygen to fully combust the gaseous products which result from detonation of the explosive material. Because of this, under-oxygenated explosives continue to burn after detonation. This process, called afterburn, is known to influence the late-time pressure and energy released by the explosive, which has particular significance for confined explosives. Recent experimental work at the University of Sheffield, along with a small number of previous studies, has shown that some afterburn occurs at timescales commensurate with the development of the shock wave. This paper presents the results from a series of tests measuring the reflected pressure acting on a rigid target following the detonation of small explosive charges. High speed video is used to capture the emerging structure of the detonation products and air shock, whilst the spatial and temporal distributions of reflected pressure are recorded using an array of 17 Hopkinson Pressure Bars set flush with an effectively rigid target. Tests are conducted in inert atmospheres and oxygen-rich atmospheres in order to assess the contribution of rapid afterburn on the development of the shock front and interaction with a rigid target situated close to the explosive charge. The results show that early-stage afterburn has a significant influence on reflected shock parameters in the near-field.