

EXPERIMENTAL AND THEORETICAL STUDIES OF SYMPATHETIC DETONATIONS IN BLASTHOLES

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ABSTRACT

The phenomenon of sympathetic detonations in blastholes is investigated by comparing experimental observations and numerical modelling results. Numerical modelling using the TDL computer code and Forest Fire decomposition rates for commercial explosives has shown the importance of blasthole diameter, impedance of stemming material and host rock. Comparison with experimental observations has also shown that sympathetic detonations cannot always be treated as shock to detonation transitions (SDT). Examination of previous results which have been obtained from calibrated low amplitude shock experiments reveal that there is an ignition threshold prior to the detonation threshold. The difference between the two thresholds is more pronounced in the case of air bubble sensitized products. The ignition threshold can be very important under the confinement provided by the blasthole and the conditions of application. It also correlates well with the pressures expected at the gap distances of interest in the practical application. It is suggested that critical energies are used as the criterion for cross initiation in blastholes. Practical suggestions based on the numerical calculations and experiments based on these calculations are also given and discussed.