NUMERICAL SIMULATIONS OF TNT AFTERBURNING AT DIFFERENT HEIGHTS OF BLAST

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Performance evaluation of an explosive compound requires, amongst other things, determination of most appropriate charge positioning to achieve the required pressure blast and/or the afterburning effect. This paper focuses on the effect that the height of blast (HOB) has on the afterburning properties of TNT. Understanding the physical processes of afterburning and how these are affected by the surrounding conditions facilitates the optimal utilization of an explosive compound.

Here, the flow, including the shock wave interactions, afterburning and mixing resulting from simulated TNT charge explosions at three different HOB: at 0.15m, 0.5m, and 1m will be investigated. The simulations are conducted using Large Eddy Simulation (LES) with Partially Stirred Reactor (PaSR) combustion model. The simulations results are compared to experimental pressure measurements with good agreement. The results reveal that closer proximity to the ground does improve both the initial mixing and subsequent afterburning, however, in the later stages of the explosion all simulations are seen to converge to a common equilibrium stage of the afterburning, independent of the HOB, when the mixing continuously subsides and the remaining fuel is consumed.