

Detonations in Front of a Tunnel Entrance – A Parametric Small-Scale Study

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Abstract

The situation of a charge detonating somewhere in front of a tunnel entrance has been investigated in a series of small-scale experiments. The initial set of tests aims at characterizing the blast effects at some control surface (e.g., a blast door) not very far down from the tunnel entrance with respect to their dependence on the charge geometry, location and orientation.

Both spherical and cylindrical 1-g PETN charges were detonated at various positions and heights in front of the tunnel entrance. The resultant load on the end wall showed a considerable non-uniformity. Nevertheless, using the average overpressure impulse on the end wall as a ranking indicator allows to compare the effective loads for different parameter settings.

The current results indicate that for the spherical charges the typical load (in terms of the average overpressure impulse) can be estimated roughly by considering geometrical arguments. For the cylindrical charges the charge directivity and thus its orientation are of great significance when the charge is detonated at scaled stand-off distances of less than $3 \text{ m/kg}^{1/3}$.