BLAST PROPAGATION IN ROUGH-WALLED TUNNELS

E. Nof, O. Ram, E. Kochavi, G. Ben-Dor, O. Sadot

Shock Tube Laboratory, Protective Technologies R&D Center, Faculty of Engineering Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel.

ABSTRACT

The presented experimental study investigated the geometric wall effects of a structure on the behavior of an internally detonated blast. Hitherto, most blast in tunnel studies have worked to characterize blast profiles in smooth tunnels. This simplification effectively neglects wall effects including viscosity and shock reflections off the obstacles along the wall. The exploding wire technique, a rigorously confirmed method for producing accurate blast profiles, was used to simulate a blast event at the closed end of a scaled-down square tunnel with varying degrees of wall roughness. Results showed that the surface geometry of a tunnel's inner cross section has significant impact on the blast's pressure and impulse time histories. In particular, we found that wall roughness amplifies the maximum impulse in proximity to the blast source, contradicting the generally held belief that wall roughness primarily attenuates the blast wave impulse.