

PROBABILISTIC SAFETY & HAZARD MODELLING OF BLAST AND FRAGMENTATION

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ABSTRACT

Many industries consider explosive effects, either from their deliberate use, or, through a desire to protect people, systems and infrastructure. This Paper explores the deterministic nature of some commonly used blast-load and fragmentation-load models and discusses their limitations with respect to: explosive safety distances, design-loads and the accidental – or deliberate – detonation of explosives.

A new probabilistically-based blast-load model (P-Blast) is developed which takes into account the observed variability of explosive blast-loads. Following which, new forms of risk-based advice are presented. The P-Blast model uses statistical and probabilistic information taken from the literature and recently conducted explosive trials. Fragmentation loads are also considered probabilistically, and result in alternative forms of effect-based advice for decision makers. An explosive scenario of interest includes blast and fragmentation loads resulting from military munitions; however, the framework is applicable to any explosive scenario.

The Paper concludes with a discussion on how probabilistic blast-load and fragmentation models improves confidence in decision making with respect to calculating explosive safety distances, designs of protective structures, weaponeering and collateral damage estimation.