LAUNCHED DISTANCE BY THE FORCE OF THE BLAST

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ABSTRACT

Explosive Ordnance Disposal (EOD) Technicians and other individuals exposed to explosive blast are likely to be launched by the strength of the blast wave, thereby hitting either the ground or other surrounding obstacles at high speed, potentially resulting in severe blunt impact trauma (tertiary blast injuries). In a previous study, a simple analytical model had been devised to estimate the so-called "launched distance", for free-field scenarios, based on the explosive mass and standoff distance. However, this initial study only involved large explosive charges (50 to 100 kg of TNT). The current paper discusses tests recently carried out using smaller charges (5 and 10 kg), thus extending the dataset across a wider range of explosive masses. Unfortunately, the simple analytical model was based on too many simplifying assumptions (use of the calculated reflected impulse, no consideration of the human body shape and relative location of the explosive). To address this gap, the present paper introduces numerical simulations (LS DYNA) using the Hybrid III mannequin model, exposed to various blast configurations. The results from the numerical simulations confirm that EOD technicians can be propelled large distances, thereby requiring a high level of blunt impact protection. Moreover, numerical simulations were used to simulate actual real-life events, by mimicking the technician displacement, in a way to estimate the explosive charge that was used (forensics application).