

Influence of Charge Shape and Orientation on the Response of Steel-Concrete Composite Panels

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Abstract

Blast design codes usually generalize the shape of the charge as spherical or hemispherical. However, it was found that the blast overpressure of cylindrical charges differ greatly when compared with relevant analytical results generated with the charges assumed to be spherical. The objective is to use fully coupled 3D multi-material arbitrary Lagrangian Eulerian (MMALE) modelling technique in LS Dyna software to simulate the cylindrical charge blast loading. Comparison of spherical and cylindrical charge blast simulation was carried out to show the influence on peak overpressure and total impulse. Two steel-concrete composite specimens were subjected to blast testing under cylinder charges for benchmarking against numerical results. It was found that top detonated, vertical cylinder charge could give much higher blast loading compared to horizontal cylinder charge. The MMALE simulation could generate the pressure loading of various charge shape and orientation to be used for predicting the response of the composite panel.

Keywords: blast, charge shape, MM-ALE, steel-concrete composite

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