

## ENERGY EQUIVALENT IMPULSE METHOD FOR BLAST INDUCED GROUND SHOCK LOADS

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Single Degree of Freedom (SDOF) method is simple to implement and efficient at predicting the flexural response of reinforced concrete components (beams, columns, walls, slabs) subjected to blast loads. At smaller scaled distances, the non-uniformity of the blast load results in conservative estimates when the peak pressure and impulse are uniformly applied throughout the structure. Energy equivalent impulse method has been shown to reasonably predict the response of near field detonations [1], delaying the need to resort to computationally expensive methods such as Finite Element Analysis (FEA).

Energy equivalent impulse method transforms a non-uniform blast load to an equivalent uniform blast load with a right triangle waveform (instantaneous rise with linear decay) as recommended in PDC-TR-06-01 [2] and UFC 3-340-01 [3]. Energy equivalent impulse method is not compatible with blast induced ground shock loads as the load history is vastly different from a right triangle, leading to an overestimated response. This paper would propose an amendment to the energy equivalent impulse method for blast induced ground shock loads by applying the ground shock load history as the waveform of the equivalent uniform blast load. Validation of the method would be performed by comparing it to the results obtained from a FEA study of a simplified component.

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- [2] U.S. Army, PDC TR-06-01 Rev 1 Methodology Manual for the Single-Degree-of-Freedom Blast Effects Design Spreadsheets, 2008.
- [3] U.S. Department of Defense, Unified Facilities Criteria (UFC) 3-340-01 Design & Analysis Of Hardened Structures To Conventional Weapons Effects, Washington D.C, 2002.