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Abstract title

Numerical Simulation of Free-Air Explosion using LS-DYNA
Currently, based on the development of advanced computational technologies, studies of the effects of explosions on large structures have become possible and as a consequence, the number of destructive experiments and their high cost can be reduced significantly. This paper presents a study of air burst explosion wave propagation using computational modelling based on LS-DYNA. Incident and reflected pressure waves are investigated, as well as the mesh sensitivity and different scaled distances, and the results are validated by an empirical method. Multi-material Arbitrary Lagrangian-Eulerian (MM-ALE) and LBE-ALE coupled methods are used to model blast and the effects of parameter values adopted in these methods, as well as the charge shape, on the propagation law are studied. The results show that LS-DYNA can effectively simulate an air burst explosion. The LBE-ALE method has a significant computational time saving, especially where larger scaled distances occur. Additionally, the mesh size has a large influence on the peak incident and reflected pressures. It is observed that there is an optimum range of the mesh size in relation to the sizes of the scaled distance and air domains. Different charge shape causes different pressure distribution over air domain.

Keywords: Numerical, Explosion, incident pressure, reflected pressure, LS-DYNA.
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