BLAST WAVE PROPAGATION IN A COMPOUND SURVIVAL SHELTER: NUMERICAL ANALYSIS AND EXPERIMENTAL VALIDATION

A. Caçoilo[1,2], R. Mourão[1,2] , B. Belkassem[1], F. Teixeira-Dias[2] , J. Vantomme[1], D. Lecompte[1]

[1]Civil and Materials Engineering Department, Royal Military Academy, Brussels, Belgium;
[2]School of Engineering, The University of Edinburgh, Edinburgh EH9 3JL, UK

Key words : Blast waves; compound survival shelter; experimental analysis; numerical modeling; LS-DYNA

Blast wave propagation in a confined environment is a complex phenomenon which is not fully described in the literature. A valid prediction of such phenomena is important when it comes to the assessment of protection of civil and military personnel. In this paper, the internal blast wave propagation in a compound survival shelter is experimentally assessed using a small-scale model of the real configuration, subjected to the detonation of an explosive charge at different positions. Pressure-time data is recorded in several locations of the model. The explicit finite element code LS-DYNA is used to develop a numerical model, representative of the experimental data. The measured pressures and impulses are compared with the simulated results in order to validate the three-dimensional finite element model. A parametric study is performed in order to study the influence of several numerical parameters. Good agreement between the test results and the predicted pressure response is achieved.