[1]ADVANCING ERDC'S BLAST LOAD SIMULATOR CAPABILITIES

J. O'Daniel[1], C. Johnson[1], G. McMahon[1], B. Steed[1], S. Parks[2], and D. Ritzel[3]

[1]U.S. Army Engineer Research and Development Center (ERDC), Geotechnical and Structures Laboratory, 3909 Halls Ferry Rd Vicksburg, MS 39056, USA;
[2]ORA Inc., 159 W. Henderson St, Marion, NC 28752, USA;
[3]Dyn-FX Consulting Ltd, 19 Laird Ave North, Amherstburg, ON N9V 2T5, Canada.

ABSTRACT

ERDC has maintained a capability to generate simulated airblast loads using its Blast Load Simulator (BLS) facility for well over a decade. Improvements are currently underway to revamp the facility to improve the fidelity of blast-wave simulation, extend the pressure/impulse range of the facility, as well as expand the size and type of targets that can be tested. In parallel, a 'Virtual BLS' is being developed using high-fidelity computational fluid dynamics (CFD) codes such as DYSMAS to both predict the loading environment and conduct parametric studies not feasible by testing alone. The ERDC Advanced Blast Load Simulator (ABLS) facility is being developed in phases using the simulator design introduced by Ritzel and Parks that replicates the wave-dynamics of actual free-field blast. Due to the scale and required strong shock levels for a 3.7m simulator, a gaseous combustion Driver will be used; special developments are required to eliminate adverse reflections for 'diffraction' and 'reflection' targets. The current paper describes the background to the facility development including a discussion of limitations of the existing conventional physical simulator and the evolution of the ABLS design including operational and siting constraints.