

DESIGN, CONSTRUCTION, AND EARLY COMMISSIONING TRIALS OF THE ERDC 3.7M ADVANCED BLAST LOAD SIMULATOR

S. Parks¹, C. Johnson², A. Riegel³, D. Boppe³, and D. Ritzel⁴

¹*ORA, Inc., PO Box 759, Marion, NC 28752 USA*

²*U.S. Army Engineer Research and Development Center (ERDC), Geotechnical and Structures Laboratory, 3909 Halls Ferry Rd Vicksburg, MS 39180 USA*

³*Stumptown Research and Development, LLC, PO Box 1960, Marion, NC 28752 USA*

⁴*DynFX, Ltd., 19 Laird Ave North, Amherstburg, ON N9V 2T5 Canada*

Keywords: Airblast, Simulator, Experimental, Design, Operation

The Advanced Blast Simulator (ABS) is a highly specialized shock-tube to generate tailored shock waves in a laboratory facility to match the characteristics of true free-field explosive blast including negative phase and secondary shock [1,2]. Since 2015, 18 ABS have been built for laboratories in the United States, Canada, and Australia from the scale of 0.2 – 2.4m in cross-section.

The U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi, USA maintains a core capability for large-scale blast qualification testing of structures, equipment, and materials. In 2016 ERDC acquired a 1.2m ABS with gas-detonation Driver technology as a prototype proof-of-concept for the planned development of a 3.7m simulator [3]. The current paper presents the design, construction, and early commissioning results of the 3.7m facility, the ABL12. The required scale, high-performance range, and modularity of the system called for novel approaches regarding practically all aspects of the design which are described. In preliminary testing the facility has surpassed its required performance range for incident and reflected loading.

References

- [1] Ritzel, D.V., Parks, S.A., 2010, Blast Simulation using Shock-Tube Technology, 21st Int'l Symposium on Military Aspects of Blast and Shock, MABS21, Jerusalem, Israel.
- [2] US Patent 9027383, 2015, Advanced Blast Simulator, US Patent Office.
- [3] Parks, S.A., Ritzel, D.V., O'Daniel, J., Johnson, C., 2016, Development of a 1.2m Prototype Advanced Blast Load Simulator, 24th Int'l Symposium on Military Aspects of Blast and Shock, MABS24, Halifax, NS, Canada.