LIMITATIONS AND CONSEQUENCES OF FRAGMENT PROTECTION FOR NEAR-FIELD AIRBLAST MEASUREMENTS

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Obtaining pressure and impulse data from explosions where fragments are present can be challenging. One way of protecting airblast gauges from damage due to fragment debris is to place a small but physically robust obstruction directly between the charge and the target. Typically, a vertical metal pole (steel pipe, usually) is positioned ten pole diameters away from the gauge directly in-line between the charge and the gauge. The presence of this pipe, however, reduces the amount of blast energy that reaches the target and affects the measured pressure record. A widely implemented rule of thumb suggests that placing the pole at a standoff of ten pole diameters from the gauge causes a negligible reduction in the airblast impulse that reaches the target.

The effect of such obstructions on near-field airblast measurements has been investigated using the 2D Arbitrary Lagrangian-Eulerian (ALE) and fluid-structure interaction (FSI) capabilities of LS-DYNA. Both a single pole as well as an array of three adjacent poles were analyzed and compared to results without any obstructions. The results provide valuable insights into the sensitivity of pressure and impulse measurements to the number, diameter, and position of these obstructions. These observations can be used to assist in interpreting gauge records from behind these poles as well as in designing test bed layouts that minimize the effects of poles on the results.