

FURTHER CHARACTERIZATION OF A LARGE SHOCK TUBE

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This presentation is a continuation of the presentation from the last MABS meeting. As the mass of drive explosive has been increased from what was previously described, it has been found that the tube output pressure does not scale as simple theory, or intuition, would suggest. Instead, a new approach has been required to obtain the peak pressure (~150psi) required in such a large Shock Tube. The measured scaling law, the results from the scoping trials as well as the modified approach will be presented. It is thought useful to present these findings in a readily accessible venue to assist any future efforts at other institutions in understanding what is required to get high peak pressures from such a large Shock Tube.

Los Alamos National Laboratory has the requirement to blast load some test objects with a prescribed air pressure profile. The pressures and durations of this profile are best produced using a long, and large diameter, shock tube. This submission relates to the design, fabrication, commissioning, modeling, and calibration pressure profiles obtained from a 45.7m long, 2.4m diameter shock tube driven with between 45kg and 90kg of explosive.

Time of arrival or side on pressure gauges are placed at locations along the tube wall to assist the ongoing modeling efforts. Additionally, 4 pencil free-field pressure gauges and 2 stagnation gauges are placed at the end of the tube to measure the pressure profile that would impinge on any future test object placed at the open end.

Early tests, reported previously, at lower drive explosive masses suggested that the required peak pressure could be reached fairly simply with a single charge of modest aspect ratio (1:3). In reality, increasing the explosive mass turned out not to follow this initial trend and extrapolating to the required extent would have resulted in serious damage to the tube. Instead a distributed explosive charge (>1:60) appears to be required and the results from this new configuration will be presented.

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