DEFINITION OF THE BLAST ENVIRONMENT IN THE LB/TS EXIT JET

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A series of experiments and three-dimensional calculations has been completed which defines the detailed environment in the exit jet of the Large Blast and Thermal Simulator (LB/TS). The environments closely correspond to nuclear non-ideal (precursor) environments in terms of dynamic pressure and dynamic pressure impulse. The magnitude of the environments is proportional to the driver pressure. An 1800 PSI driver pressure was calculated to produce non-ideal air blast dynamic pressure impulse in excess of 50 Kpa*sec, with a peak dynamic pressure of nearly 2 bars and a duration of over half a second. The calculations were used to determine the extent of and gradients within the region outside the open end of the shock tube. Measurements made during the experiments provided several pressure time histories. The calculations, once validated against the data, could be used to define the overall flow field environment.

The domain of the calculations extended from 25 m inside the LB/TS to 80 m outside the end of the tube and 60 m on either side. The three-dimensional grid extended 30 m above the top of the tube and 5 m below the floor on the exterior of the tube. A total of 35 million zones were used to describe the environment. In the experiment, six sets of gauge mounts were used to measure the environment at two distances, three cross-flow positions and up to four heights.

In the calculation, approximately 1500 monitoring points or stations were used to record the air blast and flow parameters as a function of time and space. Each of these stations provided a full time history of all blast parameters.Using the output of these stations, we were able to construct three-dimensional blast environment surfaces for any blast parameter. Contours of peak dynamic pressure, peak overpressure and dynamic pressure impulse proved especially valuable in designing the experiments. Results of these calculations were also used to provide boundary conditions for target loads calculations.
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