

## SHOCKTUBE FOR BLAST/FIRE INTERACTION STUDIES

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The unique features and capabilities of a 30 inch-diameter, air driven shock-tube are described and illustrated with example applications. The shocktube was specifically intended as a tool for study of the fluid physics of the interaction of blast waves with burning objects, to answer the question of whether fires initiated by the nuclear thermal pulse are effectively extinguished by the ensuing nuclear air blast--a key uncertainty in fire damage prediction for nuclear incidents.

The facility was designed to simulate ideal pressure-time waveforms of kiloton-to-megaton nuclear explosions in air with independently variable peak overpressures (to at least 25 psi) and positive-phase durations (from less than 100 ms to more than 3 seconds). The need for an excessively long tube to prevent premature rarefaction was avoided by using a system of orifices and a receiver tank at the exhaust end of the shocktube. Orifice sizes are chosen to balance in- and outflows while the test section is pressurized.

The shocktube design accommodates various shock and flow diagnostic techniques; including motion picture, shadowgraph, phototransistor, and particle-motion visualization. An automatic pneumatically-driven telescoping breach closure at the test section permits simulation of free-burning fire behavior prior to blast initiation.

Our experience to date indicates that indeed most of the critical fire extinguishment conditions are within the range of the airblast conditions provided by the shocktube. Illustrative data will be presented.