COUPLING OF BLAST INTO A TUBE FROM EXTERNAL DETONATIONS

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Five experiments were performed to measure the blast pressures inside a rigid tube produced by explosions near the open end of the tube. The explosive charges were 600-gram cylinders of Grade A Composition B with length to diameter ratio of 5 to 1. The tube was circular in cross section with a diameter of 460 mm and a length of 2735 mm with the axis horizontal. Outside the open end of the tube were two rigid plates, one tangent to the inside circular surface at the bottom and one orthogonal to the tube axis. The other end of the tube was closed with a rigid plate orthogonal to the tube axis. The charge positions ranged from 360 mm inside the tube to 460 mm outside the tube, in all cased with the center of mass on the axis of the tube. Four experiments oriented the cylindrical charge vertically with top end initiation; the fifth oriented the charge axially with tail end initiation. In each experiment, tube wall pressure was measured at 3 axial locations with 120-degree spacing; end wall pressure was measured at 7 locations. The dependence of the internal blast environment on charge location and orientation was extracted from these measurements and compared against the LS2000 model[3]. In addition, the results were compared with those from laboratory-scale experiments (1-gram charges) performed at EMI[4]. In both cases, the comparisons are very favorable.

[3] Bernard Anet and Eduard Binggeli, "LS-2000 Airblast Phenomena Due to Nuclear and Conventional Explosions," Defence Procurement Agency, Spiez, Switzerland.

[4] Peter Neuwald and H. Reichenbach, Ernst Mach Institute, "Detonations in Front of a tunnel Entrance—A Parametric Small-Scale Study, 17th MABS, 2002.