

HIGH-ENERGY (MACH 130) AIR-SHOCK PROPAGATION IN STEEL AND GROUT PIPES,

GLENN,H.D.;KRATZ,H.R.;KEOUGH,D.D.;SWIFT,R.P.

Voitenko compressors were used to generate 4.5 cm/microsec air shocks in a steel and a grout outlet pipe. Diaphragm burst times and time-of-arrival data of shock-front luminosity along the 2-cm-i.d. exit pipes are provided by fiber-optic ports. Pressure profiles were obtained for this high enthalpy shock propagation for the first time and at many locations in both experiments. The Voitenko-grout experiment represents the first laboratory attempt to study shock propagation with this type of compressible wall material.

The primary purpose of these two experiments was to examine the effect of wall material on high-energy shock propagation. In the interval between 10- and 250-cm from the diaphragm the velocity and peak pressure of the shock front attenuated from 4.5 to 0.5 cm/microsec and 21 to 0.2 kb, respectively. Over this distance the shock propagation gave nearly identical results for both experiment within the range of experimental accuracy. The rapid attenuation of the shock front velocity and pressure is attributed to ablation and entrainment of wall material. An interesting feature that was observed, confirmed by multiple measurement techniques, was rapid oscillation of the pressure profiles. The results indicate that the shock propagation is independent of wall composition to the extent of materials considered over the 250-cm distance of the outlet pipes.