THE SIMULATION OF INFANTRY WEAPON BLAST USING A COMPRESSED GAS SOURCE

GRIMSHAW,J.F.;PENNELEGION,L.

An understanding of the factors influencing the propagation of blast waves from weapons is essential if it is to be possible to assess the noise characteristics of a new weapon design without extensive full scale firing tests.
In order to investigate the structure and motion of weak blast waves in the laboratory, a small blast generator has been used which consists of a cylinder of high pressure gas which may be suddenly vented to the atmosphere through any one of a range of interchangeable divergent nozzles. Although it is impossible to duplicate the exact properties of hot propellant gases governing the flow, it is possible to duplicate sound speed and specific heat ratio independently using various gases at room temperatures. In the present study helium, air and carbon dioxide have been used to produce blast waves, helium nearly matching the sound speed and carbon dioxide the specific heat ratio of propellant gases while air has values of these parameters lying between the other two gases. The blast overpressures around the generator, measured using miniature blast gauges, show a marked variation in magnitude and distribution with change of driver gas. Despite variations of up to a factor of four in these overpressures between gases they may be normalized successfully using the mass flow rate through the nozzle. A photographic study of the developing blast wave has been made using both an image converter camera framing at up to 10**6 s-1 to record the near field early blast growth (up to 2 calibres from the nozzle exit) and double and multiple spark shadowgraph methods to deduce velocities and blast wave strength over a greater distance. Photographs of the developing flow confirm gross differences in the blast structure for the different gases.