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Implosion-driven technique to create fast shock waves in highdensity gas MATTHEW SERGE, DANIEL SZIRTI, JASON LOISEAU, AN-DREW HIGGINS, McGill University, VINCENT TANGUAY, Defence R&D Canada-Valcartier — The ability of an explosively clad tube to drive high velocity (> 8 km/s), quasi-steady shock waves through a high pressure (> 10 MPa) gas filling the tube is investigated. The experimental device consists of a thin-walled tube filled with high-pressure helium and then surrounded by a layer of explosive in turn surrounded by a thick-walled tamper. Implosion causes the inner tube to pinch, forming a shock wave that moves into the gas faster than the detonation wave. The limitation of the device is the dynamic yielding and failure of the tube containing the gas. Multiple geometries are explored, which vary the thickness and number of explosive layers. The incorporation of secondary steel cylinders in the explosive layer to act as a dynamic tamper is also investigated. A simple model for the radial, one-dimensional dynamics of the apparatus was developed to predict the relative success of the varying geometries, as measured by the relative difference in shock velocity and stand-off distance as compared to the detonation in the explosive. This technique can be coupled with phase-velocity generating devices (explosive lenses) to drive high-density shock waves to arbitrarily high velocities (> 15 km/s). In addition to being used to create states of high-energy density, this technique can be applied to an implosion-driven hypervelocity launcher for projectiles.

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