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Phase velocity enhancement of linear explosive shock tubes JASON LOISEAU, MATTHEW SERGE, DANIEL SZIRTI, ANDREW HIGGINS, McGill University, VINCENT TANGUAY, DRDC Valcartier — Strong, high density shocks can be generated by sequentially detonating a hollow cylinder of explosives surrounding a thin-walled, pressurized tube. Implosion of the tube results in a pinch that travels at the detonation velocity of the explosive and acts like a piston to drive a shock into the gas ahead of it. In order to increase the maximum shock velocities that can be obtained, a phase velocity generator can be used to drag an oblique detonation wave along the gas tube at a velocity much higher than the base detonation velocity of the explosive. Since yielding and failure of the gas tube is the primary limitation of these devices, it is desirable to retain the dynamic confinement effects of a heavy-walled tamper without interfering with operation of the phase velocity generator. This was accomplished by cutting a slit into the tamper and introducing a phased detonation wave such that it asymmetrically wraps around the gas tube. This type of configuration has been previously experimentally verified to produce very strong shocks but the post-shock pressure and shock velocity limits have not been investigated. This study measured the shock trajectory for various fill pressures and phase velocities to ascertain the limiting effects of tube yield, detonation obliquity and pinch aspect ratio.

Jason Loiseau
McGill University

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