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Development of multi-component explosive lenses for arbitrary phase velocity generation JASON LOISEAU, JUSTIN HUNEAULT, OREN PETEL, SAM GOROSHIN, DAVID FROST, ANDREW HIGGINS, McGill University, Mechanical Engineering Dept., 817 Sherbrooke St. W., Montreal, Quebec, H3A 2K6, Canada, FAN ZHANG, Defence R&D Canada - Suffield, PO Box 4000, Station Main, Medicine Hat, Alberta, T1A 8K6, Canada — The combination of explosives with different detonation velocities and lens-like geometric shaping is a well-established technique for producing structured detonation waves. This technique can be extended to produce nearly arbitrary detonation phase velocities for the purposes of sequentially imploding pressurized tubes or driving Mach disks through high-density metalized explosives. The current study presents the experimental development of accelerating, multi-component lenses designed using simple geometric optics and idealized front curvature. The fast explosive component is either Composition C4 (VOD = 8 km/s) or Primasheet 1000 (VOD = 7 km/s), while the slow component varies from heavily amine-diluted nitromethane (amine mass fraction exceeding 20%) to packed metal and glass particle beds wetted with amine-sensitized nitromethane. The applicability of the geometric optic analog to such highly heterogeneous explosives is also investigated. The multi-layered lens technique is further developed as a means of generating a directed mass and momentum flux of metal particles via Mach-disk formation and jetting in circular and oval planar lenses.

Jason Loiseau
McGill University, Mechanical Engineering Dept.,
817 Sherbrooke St. W., Montreal, Quebec, H3A 2K6, Canada

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