

Abstract Submitted
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Enhancing Impact Speed with Shock Interactions in a Restricting Die¹ WILLIAM ANDERSON, BRIAN JENSEN, FRANK CHERNE, CHARLES OWENS, KYLE RAMOS, MARK LIEBER, Los Alamos National Laboratory — There is a need to increase the impact velocities that can be achieved with gun systems used for impact and shock compression studies. Two-stage guns normally required for high-velocity studies are expensive and relatively rare, while most single-stage guns have modest performance (0.2-2 km/s) that limits their utility for high-pressure and high-velocity studies. In this work, we are developing a technique that uses a low-strength sabot, coupled with a restricting die, to increase the impact velocity without modifying the gun itself. Impact of the projectile with the die, which is typically attached to the muzzle of the gun, generates shock waves in the sabot that interact to accelerate the front of the projectile, while decelerating the rear portion. The performance achieved by this technique is greater than would be expected from a simple nozzle working on a fluid with the properties of the sabot. Preliminary experiments using this technique have observed a velocity enhancement of close to a factor of two. The performance that can be achieved is critically dependent on the stress field geometry and we are currently developing a set of models and calculations to optimize this system.

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