Abstract Submitted
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Laboratory experiments to study supersonic astrophysical flows interacting with clumpy environments P.A. ROSEN, J.M. FOSTER, AWE, B.H. WILDE, R. COKER, LANL, B.E. BLUE, GA, R.J.R. WILLIAMS, AWE, F. HANSEN, C. SORCE, LLNL, P. HARTIGAN, R. CARVER, J. PALMER, Rice University — A wide variety of objects in the universe drive supersonic outflows through the interstellar medium which is often highly clumpy. These inhomogeneities affect the morphology of the shocks that are generated. The hydrodynamics is difficult to model as the problem is inherently 3D and the clumps are subject to a variety of fluid instabilities as they are accelerated and destroyed by the shock. Over the last two years, we have been carrying out experiments on the University of Rochester's Omega laser to address the interaction of a dense-plasma jet with a localized density perturbation. More recently, we have turned our attention to the interaction of a shock wave with a spherical particle. We use a 1.6-mm diameter, 1.2-mm length Omega hohlraum to drive a composite plastic ablator (which includes bromine to prevent M-band radiation from preheating the experiment). The ablator acts as a "piston" driving a shock into 0.3 g/cc foam containing a 0.5-mm diameter sapphire sphere. We radiograph along two orthogonal lines of sight, using nickel or zinc pinhole-apertured x-ray backlighters, to study the subsequent hydrodynamics. We present initial experimental results and multi-dimensional simulations of the experiment.

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