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Study of Perturbations on High Mach Number Blast Waves in Various Gasses A. EDENS, R. ADAMS, P. RAMBO, J. SHORES, I. SMITH, B. ATHERTON, Sandia National Labs, T. DITMIRE, University of Texas at Austin — We have performed a series of experiments examining the properties of high Mach number blast waves. Experiments were conducted on the Z-Beamlet[1] laser at Sandia National Laboratories. We created blast waves in the laboratory by using 10 J- 1000 J laser pulses to illuminate millimeter scale solid targets immersed in gas. Our experiments studied the validity of theories forwarded by Vishniac and Ryu[2−4] to explain the dynamics of perturbations on astrophysical blast waves. These experiments consisted of an examination of the evolution of perturbations of known primary mode number induced on the surface of blast waves by means of regularly spaced wire arrays. The temporal evolution of the amplitude of the induced perturbations relative to the mean radius of the blast wave was fit to a power law in time. Measurements were taken for a number of different mode numbers and background gasses and the results show qualitative agreement with previously published theories for the hydrodynamics of thin shell blast wave. The results for perturbations on nitrogen gas have been recently published[5]. .[1]P. K. Rambo, I. C. Smith, J. L. Porter, et al., Applied Optics **44**, 2421 (2005). [2]D. Ryu and E. T. Vishniac, Astrophysical Journal **313**, 820 (1987). [3]D. Ryu and E. T. Vishniac, Astrophysical Journal **368**, 411 (1991). [4]E. T. Vishniac, Astrophysical Journal **274**, 152 (1983). [5]A. D. Edens, T. Ditmire, J. F. Hansen, et al., Physical Review Letters **95** (2005).

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