Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Observation of strong oscillations of areal mass in an unsupported shock wave produced by a short laser pulse[1] Y. AGLITSKIY, SAIC, M. KARASIK, A.L. VELIKOVICH, V. SERLIN, J.L. WEAVER, T.J. KESSLER, A.J. SCHMITT, S.P. OBENSCHAIN, Plasma Physics Division, NRL, N. METZLER, J. OH, RSI — The first experimental study of hydrodynamic perturbation evolution in a strong unsupported shock wave, which is immediately followed by a rarefaction wave, is reported. Our planar solid polystyrene laser-machined targets, 50 to 100 μm thick, rippled from the front side with a single-mode wavelength 30 or 45 μm and peak-to-valley amplitude 4 to 6 μm, were irradiated with a 350 ps long Nike KrF laser pulse at peak intensity of up to 330 TW/cm^2. The perturbation evolution in the target was observed using face-on monochromatic x-ray radiography while the pulse lasted and for 3 to 4 ns after it ended. While the driving pulse was on, the areal mass modulation amplitude in the target was observed to grow by a factor of up to $\sim$4 due to the ablative Richtmyer-Meshkov instability. After the end of the pulse, while the strong unsupported shock wave propagated through the unperturbed target, the theoretically predicted large oscillations of the areal mass [A. L. Velikovich *et al.*, Phys. Plasmas **10**, 3270 (2003)] were observed. Multiple phase reversals of the areal mass modulation have been detected.

[1]Work supported by DOE/NNSA and Office of Naval Research.

Alexander Velikovich
Plasma Physics Division, Naval Research Laboratory

Date submitted: 29 Jul 2011 Electronic form version 1.4