Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Transient Imaging Displacement Interferometry Applied to Shock Loading. SCOTT GREENFIELD, SHENGNIAN LUO, DENNIS PAISLEY, ERIC LOOMIS, DAMIAN SWIFT, AARON KOSKELO, Los Alamos National Laboratory — We have applied Transient Imaging Displacement Interferometry (TIDI) to copper and beryllium samples subjected to various loading methods. TIDI captures the full-field out-of-plane surface displacement map single-shot with the time resolution of the illumination pulses (ca. 100 ps). Displacement sensitivity of better than 10 nm with lateral spatial resolution of roughly 5 microns is achieved over our ca. 1 mm^2 field-of-view. A framing camera allows capture of up to eight displacement maps for a single loading event, allowing the evolution of the surface motion to be tracked. Loading methods using the TRIDENT laser at Los Alamos have included laser-launched flyers, direct drive, and confined ablation. Point and line VISARs are used as complementary diagnostics that provide a temporally continuous record of the velocity history of the sample, and also provide time stamps for the TIDI displacement maps. The rich heterogeneity in the surface displacement due to the grain structure of the sample is readily measured. We will use TIDI to attempt to observe small voids in the regime of incipient spall, and track the dynamics of their growth. Other experiments will quantify shock roughening on ICF-related targets.

Scott Greenfield
Los Alamos National Laboratory

Date submitted: 23 Feb 2007 Electronic form version 1.4