Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Hydrodynamics of Blast Waves in LPI Gasbags SHON PRISBREY, LARRY SUTER, NATHAN MEEZAN, Lawrence Livermore National Laboratory — Gasbags and gas-filled hohlraums utilizing thin membranes have been used extensively to study laser plasma interactions in ignition relevant regimes. A hydrodynamic feature of these targets is an inward traveling blast wave or density spike. These blast waves are perturbations that are important to the laser plasma interaction (LPI) physics. In the case of gasbags, they define an ever decreasing "interaction" region where the plasma conditions are relatively uniform. In higher density targets, they compromise the interpretation of Raman backscatter measurements since the density spikes tend to heavily absorb the longer-wavelength Raman light. In this paper we discuss the hydrodynamics of blast waves in LPI. We show the scaling, under fluid approximation, of blast wave density and velocity verses input parameters such as: laser intensity, skin density, gas density, Atwood number, etc. We present analytic modeling that simply explains the hydrodynamics and explore some ways in which to reduce the perturbations: pulse shaping and replacing the window with intermediate density closed cell foams. This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48, UCRL-ABS-213751.

Shon Prisbrey
Lawrence Livermore National Laboratory

Date submitted: 22 Jul 2005

Electronic form version 1.4