Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Shock Ejecta Entrainment in Gas[1] MICHAEL FURNISH, Sandia National Laboratories — In a continuation of earlier work, paired metal shock ejecta experiments, with and without helium fill, are used to measure shock ejecta motion in gas. The vacuum ejecta experiments use Asay foils and PDV to characterize ejecta properties, and the gas ejecta experiments use PDV. FFT analysis of the PDV signals gives a qualitative indication of the presence of such ejecta and of its motion; this can be "calibrated" via the Asay foil data. For modest amounts of ejecta (allowing enough light to reach the free surface and return to the probe to give a strong free surface velocity signal), the FFT amplitudes are roughly proportional to the ejecta areal density, where the proportionality constant depends on the shape and size distribution of the ejecta particles. We assume these are consistent for the two samples in each experiment pair, although limitations to this assumption (e.g. ejecta disruption by the gas) are discussed. An additional caveat is that PDV only measures the motion of ejecta with particle sizes exceeding the 1550 nm light wavelength. Experiments to assess optimal generators of shock ejecta detectable by PDV are also presented. Indium was found to work well in the pressure regime studied.

[1]Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin company, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Michael Furnish
Sandia National Laboratories

Date submitted: 22 Nov 2011 Electronic form version 1.4