Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Modification of the Hugoniot adiabat due to turbulence generated in shocked deuterium-filled CH foams[1] A.L. VELIKOVICH, Plasma Physics Division, Naval Research Laboratory, J.G. WOUCHUK, C. HUETE RUIZ DE LIRA, UCLM, ETSII-INEI Campus s/n Ciudad Real, Spain — Direct-drive laser targets are often designed with DT-filled CH foam ablator. Accurate modeling of these targets requires understanding of shock propagation in such non-uniform media. The interaction of the shock front with the preshock random density non-uniformities generates a random motion (turbulence) in the postshock flow. The energy coupled into the postshock turbulent motion, in turn, modifies the shock adiabat. As first detected in simulations by G. Hazak *et al.*, Phys. Plasmas **5**, 4357 (1998), shock compression and shock velocity in a deuterium-filled foam would be, respectively, less and greater than those predicted for the uniform medium of the same average density. We report an exact analytical theory of this "shock under-compression" effect and present explicit formulas for the shock adiabat modification. We discuss the contributions of post-shock Reynolds stresses, acoustic energy flux emitted downstream and correlations between vortical and entropy perturbations and highlight the difference between the cases of 2D and 3D turbulence.

[1]Work supported by US DoE/NNSA (A. L. V.), Ministry of Science, MEC(FIS2006-05389) and Junta de CLM (PAI08-0182-3162), Spain (J. G. W and C. H. R. de L.)

Alexander Velikovich
Plasma Physics Division, Naval Research Laboratory

Date submitted: 10 Jul 2009 Electronic form version 1.4