Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Probing the dynamic response of ordered lattice materials[1] J. LIND, Lawrence Livermore National Laboratory, B. J. JENSEN, Los Alamos National Laboratory, M. BARHAM, N. R. BARTON, M. KUMAR, Lawrence Livermore National Laboratory — The advent of additive manufacturing has opened up the possibility of designing and creating lattice structures that were previously not possible. Their remarkable strength-to-weight scaling has garnered immense interest from the research community, but one must ask if their strength, which depends uniquely on their geometric and topological character, still holds when they are deformed dynamically? Taking advantage of the newly commissioned Dynamic Compression Sector at the Advanced Photon Source at Argonne National Laboratory, we performed a series of gas gun experiments combined with x-ray phase contrast imaging measurement on additively manufactured polymer lattice and foam structures. With on the order of micron resolution and 100s of ns temporal resolution, the local deformation characteristics of the material can be extracted by tracking the nodal displacements within the lattice material. Properties such as local ligament strain, maximum supported strain, compaction behavior and elastic wave evolution can be extracted from this measurement. We will discuss on-going comparison of the experimental results with direct numerical simulations.

[1]This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Jonathan Lind
Lawrence Livermore National Laboratory

Date submitted: 24 Feb 2017 Electronic form version 1.4