SHOCK17-2017-000608

Abstract for an Invited Paper
for the SHOCK17 Meeting of
the American Physical Society

Two-dimensional imaging and velocimetry to diagnose heterogeneous deformation under dynamic compression[1]

SUZANNE ALI, Lawrence Livermore Natl Lab

As a material is dynamically compressed, heterogeneities form, perturbations propagate, and fracture networks develop. Information about the deformation and fracture of materials under shock compression is typically obtained in one of two ways; either derived post-shock, (i.e. from recovery experiments), where the material is shocked and then the recovered sample is examined, or inferred from features in one-dimensional transiting wave profiles. The first provides very limited information with regards to the time scale of deformation mechanisms, and the second provides limited information with regards to spatial scales. Recently, a two-dimensional imaging velocimetry technique has been developed on Omega (OHRV 2D-VISAR system) to measure the velocity roughness of shock fronts. We have used this diagnostic to study the heterogenous deformation in the elastic-plastic regime in diamond as well the propagation of perturbations in GDP, beryllium, and high density carbon ablators, observing features that are difficult to identify in one-dimensional experiments, but important for fully understanding dynamic material response.

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