Also, this abstract submission replaces submission DPP17-2017-001269.

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Modeling and design of radiative hydrodynamic experiments with X-ray Thomson Scattering measurements on NIF[1] K.H. MA, H.J. LEFEVRE, P.X. BELANCOURT, University of MIchigan, M.J. MACDONALD, University of California, Berkeley, T. DOEPPNER, Lawrence Livermore National Laboratory, P.A. KEITER, C.C. KURANZ, E. JOHNSEN, University of Michigan — Recent experiments at the National Ignition Facility studied the effect of radiation on shock-driven hydrodynamic instability growth. X-ray radiography images from these experiments indicate that perturbation growth is lower in highly radiative shocks compared to shocks with negligible radiation flux. The reduction in instability growth is attributed to ablation from higher temperatures in the foam for highly radiative shocks. The proposed design implements the X-ray Thomson Scattering (XRTS) technique in the radiative shock tube platform to measure electron temperatures and densities in the shocked foam. We model these experiments with CRASH, an Eulerian radiation hydrodynamics code with block-adaptive mesh refinement, multi-group radiation transport and electron heat conduction. Simulations are presented with SiO_2 and carbon foams for both the high temperature, radiative shock and the low-temperature, hydrodynamic shock cases. Calculations from CRASH give estimations for shock speed, electron temperature, effective ionization, and other quantities necessary for designing the XRTS diagnostic measurement.

[1]This work isfundedby the LLNL under subcontract B614207, and was performed under the auspices of theU.S. DOEby LLNLunder Contract No. DE-AC52-07NA27344

Kevin Ma
Univ of Michigan - Ann Arbor

Date submitted: 21 Jul 2017 Electronic form version 1.4