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Radiation Hydrodynamics Modeling of Hohlraum Energetics[1]
MEHUL V. PATEL, CHRISTOPHER W. MAUCHE, OGDEN S. JONES, HOWARD A. SCOTT, Lawrence Livermore National Laboratory — Attempts to model the energetics in NIF Hohlraums have been made with varying degrees of success, with discrepancies of 0-25% being reported for the X-ray flux (10-25% for the NIC ignition platform [1] hohlraums). To better understand the cause(s) of these discrepancies, the effects of uncertainties in modeling thermal conduction, laser-plasma interactions, atomic mixing at interfaces, and NLTE kinetics of the high-Z wall plasma must be quantified. In this work we begin by focusing on the NLTE kinetics component. We detail a simulation framework for developing an integrated HYDRA [2] hohlraum model with predefined tolerances for energetics errors due to numerical discretization errors or statistical fluctuations. Within this framework we obtain a model for a converged 1D spherical hohlraum which is then extended to 2D. The new model is used to reexamine physics sensitivities and improve estimates of the energetics discrepancy.

[1] Lindl et al, Physics of Plasmas 21, 020501 (2014); Maclaren et al, PRL 112, 105003 (2014).
[2] M. Marinak et al., Phys. Plasmas 8, 2275 (2001).

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Mehul Patel
Lawrence Livermore Natl Lab

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