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Analysis of Predictivity of Hohlraum Simulations of Implosion Experiments on the NIF[1] JAY SALMONSON, OGDEN JONES, JOSEPH KONING, MEHUL PATEL, DAVID STROZZI, CHRISTOPHER YOUNG, Lawrence Livermore Natl Lab — Simulations of NIF hohlraum implosion experiments are unable to reliably predict several key features of the resulting capsule implosion, particularly bang-time and shape. To better understand what parameters or physics models are necessary to improve predictivity, we simulate 20+ NIF ignition experiments in HYDRA, varying several key physics packages and parameters. The experiments are selected from four experimental campaigns, and include keyholes, convergent ablator symcaps, and layered implosions. The four campaigns include three using high-density carbon capsule ablator material: the ignition campaign using depleted Uranium hohlraums, BigFoot with Gold hohlraums, and the Hybrid-B campaign. The fourth campaign is 2-Shock campaign that uses plastic capsule ablator material. Parameters and packages to be tested include mesh resolution, laser scatter and absorption parameters, cross-beam energy transfer and backscatter, high fidelity opacity models of hohlraum wall material, and non-local heat conduction models. These simulations are performed with the HyPyD Hydra Python Deck, allowing a robust, standardized framework on which to field these surveys. Simulation synthetic diagnostic results are grouped into benchmark categories; nuclear (yield, ion temperature, down-scatter ratio), shape (x-ray bang-time P2, P4), bang-time, etc., and compared with experiments so the overall impact of any given physics package can be assessed across all campaigns.

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