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Modeling NIF Polar Direct Drive Capsule Implosions in 2D and 3D using HYDRA[1] NATALIA KRASHENINNIKOVA, MARK SCHMITT, LANL, SEAN FINNEGAN, DOE — Simulations have been performed to determine the effects of asymmetries on direct drive NIF implosions. A 2.2 mm diameter, 30 micron thick CH capsule filled with 5 atmospheres DT was assumed. The radiation-hydrodynamic code HYDRA [1] was used to model the 96 NIF beams in the upper hemisphere impinging in a polar direct drive (PDD) configuration [2] on the capsule. Asymmetries in both polar and equatorial directions around the capsule were observed and analyzed. To assess the effects of removal of one of 50 degree quads for backlighting, 3D HYDRA simulations were preformed. The results showed that without re-pointing of the remaining beams in the ring, but with power compensation, the neutron yield was reduced over 70%. However, simple beam realignment to repair the symmetry, restores the yield. Additional simulations to include the effects of high-mode number equatorial capsule defects have also been performed to assess their effects on symmetry and yield. The results of these simulations and their relation to similar PDD experiments recently performed at Omega will be shown.

[1] M. M. Marinak et al., Phys. Plasmas 3, 2070 (1996).
[2] A. M. Cok et al., Plasmas 15, 082705 (2008).

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