Abstract Submitted
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Mitigation of Cross-Beam Energy Transfer in Direct-Drive Plasmas D.H. FROULA, T.J. KESSLER, I.V. IGUMENSHCHEV, S.X. HU, V.N. GONCHAROV, H. HUANG, J.H. KELLY, D.D. MEYERHOFER, A. SHVYDKY, J.D. ZUEGEL, Laboratory for Laser Energetics, U. of Rochester — Cross-beam energy transfer (CBET) during OMEGA low-adiabat cryogenic experiments reduces the hydrodynamic efficiency by 35%, which lowers the calculated one-dimensional (1-D) yield by nearly an order of magnitude. Reducing the diameter of the laser beams after a sufficient conduction zone has been generated (two-state zooming), is predicted to mitigate CBET while maintaining low-mode uniformity. A radially varying phase plate is proposed to implement two-state zooming on OMEGA. Hydrodynamic simulations, using the calculated laser spots produced by the proposed zooming scheme on OMEGA, show that implementing zooming will provide a more hydrodynamically stable implosion, allowing the in-flight aspect ratio to be reduced from 30 to 22. Alternate zooming schemes that improve the power spectrum by controlling the correlation between multiple sub-apertures will be discussed. Demonstrating zooming on OMEGA would validate a viable direct-drive CBET mitigation scheme and establish a hydrodynamically equivalent implosion pathway to direct-drive ignition. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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