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Experimental Optimization of Direct-Drive Implosions with Cross-Beam Energy Transfer D.H. FROULA, I.V. IGUMENSHCHEV, W. SEKA, D.H. EDGELL, V.N. GONCHAROV, Laboratory for Laser Energetics, U. of Rochester — Cross-beam energy transfer (CBET) in direct-drive implosions is measured to reduce the hydrodynamic efficiency of the laser drive. The outer rays of each beam interact through the ion-acoustic waves to extract energy from the central rays of each beam. This accounts for an ∼10% loss of absorption, which results in an ∼20% reduction in hydro-efficiency as measured by the scattered light and x-ray bang time. Experiments that reduce the laser energy in the outer rays by reducing the ratio of the laser spot size to target diameter by $R_{beam}/R_{target} = 60\%$ are shown to eliminate CBET and significantly increase the hydrodynamic coupling; however, the reduction in laser spot size leads to irradiation nonuniformities. An optimum laser spot size is experimentally determined that maximizes neutron yield by balancing the reduced CBET with the illumination nonuniformities. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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