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Submicron-Scale Control of the Three-Dimensional Modes 1, 2, and 3 of Targets Imploded in the Direct-Drive Configuration on OMEGA D.T. MICHEL, I.V. IGUMENSHCHEV, A.K. DAVIS, D.H. EDGELL, D.H. FROULA, V.N. GONCHAROV, D.W. JACOBS-PERKINS, S.P. REGAN, A. SHVYDKY, E.M. CAMPBELL, Laboratory for Laser Energetics, U. of Rochester — Reducing low-mode nonuniformities has been identified as a critical step to demonstrate conditions for laser-direct-drive targets that are hydrodynamically equivalent to ignition when scaled to the megajoule energies at the National Ignition Facility. The 3-D shape of the imploding target was tomographically recorded using four lines-of-sight x-ray measurements of the ablation front. The projected ablation-front contours during the implosion phase were measured with framing cameras using the x-ray self-emission shadowgraphy technique. The projected ablation-front motions were obtained by comparing the positions of the contours on the framing cameras with the corresponding contour positions measured on a nonimploding solid CH ball shot. The amplitudes of the modes were determined within 0.15% by decomposition into spherical harmonics of the contours oriented perpendicular to the lines-of-sight and shifted by the measured motions. The variations of the amplitudes in modes 1, 2, and 3 between shots were shown to change linearly (within $\pm 0.25\%$) with the variations of the mode amplitudes of the laser beam energy balance making it possible to compensate the residual target modes (that remain when the laser is balanced) within 1%. 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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