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Effects of Preheating on Compression and Rayleigh–Taylor Growth in Planar Plastic Targets on OMEGA V.A. SMALYUK, J.A. DELETTREZ, V.N. GONCHAROV, S.X. HU, D.D. MEYERHOFER, S.P. REGAN, T.C. SANGSTER, D. SHVARTS, C. STOECKL, B. YAAKOBI, Laboratory for Laser Energetics, U. of Rochester, J.A. FRENJE, R.D. PETRASSO, PSFC-MIT — Direct-drive inertial confinement fusion ignition target performance is sensitive to the details of thermal coupling, transport, and preheat that directly affect the fuel adiabat. The results of plastic, planar thin-foil acceleration and thick-foil compression experiments on OMEGA at laser intensities from $\sim 2 \times 10^{14}$ W/cm^2 agree well with 2-D simulations using a constant flux limiter (0.06). However, at intensities of $\sim 1 \times 10^{15}$ W/cm^2, a nonlocal thermal-transport model or time-dependent flux limiter is necessary to explain the experimental results. In addition, a deposited preheating of $\sim$30 J must be included into simulations at high drive intensities to match the experimental results. The reduction of the Rayleigh–Taylor growth of preimposed modulations at higher intensities correlates with measured hot-electron preheat. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement DE-FC52-92SF19460.

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