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Anomalous Absorption by the Two-Plasmon-Decay Instability in Directly Driven Inertial Confinement Fusion Experiments[1] DAVID TURNBULL, ANDREI MAXIMOV, DANA EDGELL, WOLF SEKA, TIM COLLINS, JOHN MAROZAS, RUSS FOLLETT, JOHN PALASTRO, DUSTIN FROULA, Laboratory for Laser Energetics — Simulations of directly driven inertial confinement fusion experiments on the OMEGA Laser System were significantly improved with the inclusion of an inline model for crossed-beam energy transfer along with a nonlocal model for heat transport. Absorption and shell-velocity time histories are accurately predicted when experiments are driven at relatively low overlapped laser intensity. Discrepancies appear at higher intensity, however, with higher-than-expected laser absorption on target. Strong correlation between those discrepancies and signatures of the two-plasmon-decay instability (TPDI)—including time-dependent half-harmonic emission and hard x-ray signals—indicate that TPDI is responsible for this anomalous absorption. The data suggest that up to $\sim 30\%$ of the laser right reaching $n_c/4$ can be absorbed locally when the TPDI threshold is exceeded, which is consistent with LPSE simulations.

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