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PIC simulations of the two-plasmon-decay instabilities for direct-drive ICF[1] R. YAN, A. MAXIMOV, C. REN, G. LI, University of Rochester — Preheating of fuel shells due to the hot electrons generated from the two-plasmon-decay (TPD) instability could be a potential source of yield reduction in direct-drive inertial confinement fusion. Using a particle-in-cell (PIC) code OSIRIS, we study the linear growth and saturation of TPD under conditions relevant to experiments on the Omega laser system. We compare the linear growth rates with both theories and a fluid code and study the convection of modes due to density inhomogeneity. The mode saturation was found to be closely correlated to the plasma ion density fluctuations near the quarter-critical surface. The ion density fluctuations are driven by the ponderomotive force of the plasma waves in TPD. We show this by numerically solving the governing ion-acoustic wave equation with a ponderomotive force term from the measured local envelope of the two plasma waves. For I=2×10^{15}W/cm^2, L=100μm, Te=1kev, the generated hot electrons have 1% of the laser energy and a temperature of $\sim$30kev.

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