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Particle In Cell Simulations of the Two Plasmon Decay Instability For Plane Waves in Inhomogeneous Plasmas[1] FRANK TSUNG, W.B. MORI, UCLA, B. AFEYAN, Polymath Research Inc. — A particle-in-cell code (OSIRIS) is used to investigate the two-plasmon decay instability in nonuniform plasmas of various density profiles. We find good agreement between the simulation and linear theory by Afeyan and Williams (Phys. Plas. **4**, 3827, 1997.) under a variety of laser and plasma conditions relevant to ICF. So far the theory has been tested for linear density profiles and parabolic density profiles where the perfect phase matching condition (PPMP) is at the parabolic peak density. We will also test the theorys predictions concerning growth rates and eigeneconditions when the PPMP is in the transition region between the peak density of the parabolic profile and down on the flanks where strictly linear profile behavior is recovered. These simulations allow a check on linear theory, and also demonstrate the ability of PIC codes to study this instability in small regions of ICF relevant targets. P-Polarized obliquely incident lasers will also be considered where the theory predicts a non-equal ratio between thresholds for the excitation of modes which correspond to positive and negative values of equal magnitude. This symmetry breaking in transverse momentum has never been verified in simulations before. The challenges of extending the simulations to 3D where these latter phenomena can be studied numerically will also be discussed.

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