Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Energetic-Electron Generation in Two-Plasmon-Decay Instabilities in Direct-Drive Inertial Confinement Fusion R. YAN, A.V. MAXIMOV, C. REN, Laboratory for Laser Energetics, U. of Rochester, F.S. TSUNG, U. of California, Los Angeles — We present a series of 2-D particle-in-cell (PIC) simulations of the long-term (∼10-ps) nonlinear behavior of the two-plasmon-decay (TPD) instability for parameters relevant to inertial confinement fusion. The simulations used the full PIC code *OSIRIS.* When the TPD threshold is exceeded, the simulation results show that significant laser absorption and energetic-electron (>50-keV) generation occur in the nonlinear stage. The energetic electrons are mostly forward-directed, which poses a preheating risk for targets. The hot electrons are stage-accelerated from the low-density region to the high-density region. New modes with small phase velocities develop in the low-density region after saturation, forming the first stage for electron acceleration. A fluid code has been developed to show that similar new TPD modes can develop with steady-state ion-density fluctuations. The laser absorption and hot-electron production from these 2-D plane-wave–driven PIC simulations are higher than experimental observations, which could indicate uncertainty in the simulation parameters or the importance of nonideal factors such as speckle structure in the actual laser profile. This work was supported by U.S. Department of Energy Grants No. DE-FG02-06ER54879, DE-FC02-04ER54789, DE-FG52-06NA26195, DE-FG52-09NA29552, and DE-FC52-08NA28302.

R. Yan
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 12 Jul 2011 Electronic form version 1.4