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Reduction of hot electron generation from laser plasma instabilities using circularly-polarized lasers[1] SHIHUI CAO, CHUANG REN, University of Rochester, RUI YAN, University of Science and Technology of China, HAN WEN, University of California, Los Angeles, JUN LI, Los Alamos National Laboratory — Understanding laser-plasma instabilities (LPI) is critical to the success of inertial confinement fusion (ICF). The interaction of two plasmon decay (TPD) and side stimulated Raman scattering (SSRS) was studied using 3-D particle-in-cell simulations under ICF-relevant conditions for linearly and circularly polarized lasers. In the linear stage, theoretical growth rates agreed well with the simulation results. SSRS took place under $n_e = 0.235 n_c$ and TPD dominated near the quarter-critical density surface. In the nonlinear stage, SSRS reduced TPD through pump depletion. Hot electrons were found to be first accelerated by the SSRS plasma waves and then by TPD plasma waves, different from the TPD-only staged-acceleration in the 2-D simulations. This reduced the hot-electron flux. Compared to the linearly polarized case with the same laser intensity, both SSRS and TPD were reduced due to the lower laser amplitude in the circularly-polarized case. As a result, a 30 percent decrease in hot electron flux was observed.

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