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Particle-In-Cell Simulations of the Two Plasmon Decay Instability in 2D and 3D[1] F.S. TSUNG, W.B. MORI, UCLA, B.B. AFEYAN, Polymath Research Inc. — A particle-in-cell code (OSIRIS) is used to investigate the two-plasmon decay instability in a nonuniform plasmas of various profiles. We find good agreement between the simulation and linear theory by Afeyan et al. (Phys. Plas. **4**, 3827, 1997.) By varying the lateral width of the laser drive, as would occur in a laser hot spot, the two-plasmon decay instability can be controlled and even suppressed and our simulations have verified this. As these plasmons grow, they can also accelerate electrons to relativistic energies. The temperature of the fast electrons appears to follows Coffey's wave breaking prediction. Additionally, we have also begun to look at the effect of oblique laser incidence. It can be shown that the most unstable modes are rotated by the angle of incidence. Hence, one plasmon is now more aligned with the density gradient while the other plasmon is now moves along the density gradient in a much shallower angle. The mode which is aligned to the density gradient becomes more stable because it spends less time in the resonant layer, and vice versa. While this trend can be obtained through simple geometric arguments, the quantitative theory for this effect had not been worked out until 1997 by Afeyan and Williams.

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John Tonge
University of California, Los Angeles

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