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Nonlinear Absorption of Multiple Laser Beams due to the Two-Plasmon–Decay Instability A.V. MAXIMOV, D. TURNBULL, D.H. EDGELL, J.G. SHAW, R.K. FOLLETT, H. WEN, D.H. FROULA, J.P. PALASTRO, Laboratory for Laser Energetics, U. of Rochester — In direct-drive inertial confinement fusion (ICF), laser–plasma instabilities (LPI's) such as two-plasmon decay (TPD) can significantly degrade implosion performance. The major threat of TPD has traditionally been considered hot electrons, which can preheat the fusion fuel, reducing its compressibility. However, recent data analysis of ICF experiments on the OMEGA laser and improved LPI modeling have revealed that TPD can deplete a significant fraction of laser energy, modifying the balance of scattered and absorbed light.[1] Here we explore the spatial profile of these modifications by coupling the results of wave-based LPI simulations to a ray trace in plasma profiles extracted from radiation-hydrodynamics simulations. The wave-based LPI simulations, which model TPD for realistic OMEGA beam configurations, including speckle and polarization smoothing, provide a scaling of laser absorption as a function of beam incidence angle and intensity. Using this scaling, the ray trace provides the spatial profile of absorption and scattering. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

[1]D. Turnbull *et al.*, Phys. Rev. Lett. **124**, 185001 (2020).

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