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Simulations of Stimulated Raman Scattering in One and Two Dimensions B.J. WINJUM, F.S. TSUNG, W.B. MORI, UCLA, A.B. LANGDON, LLNL — Using the full-PIC code OSIRIS, we have studied stimulated Raman scattering (SRS) over a wide range of parameters relevant to NIF. In previous one-dimensional simulation studies using reduced PIC, Vlasov, or full PIC models, the modification of the electron distribution function and electron trapping effects are believed to play the dominant role in explaining the recurring behavior of SRS reflectivity. Vu et al., have proposed that a nonlinear frequency shift due to the trapped particles detunes the instability, Brunner and Valeo argue that the trapped-particle instability is the dominant saturation mechanism, while L. Yin et al., claim that electron beam acoustic modes are important. We will discuss the role played by each of these effects in OSIRIS simulations, as well as the importance of plasma wave convection on the recurrence of SRS reflectivity. In extending the simulations to two dimensions, we will discuss side-scattering and electron trapping by both forward and backward SRS. When the laser intensity is near-threshold for SRS and the laser is focused to a finite width, we find that the physics remains rather one-dimensional. On the other hand, for plane-wave lasers, as well as for higher-intensity lasers, the physics becomes multi-dimensional. Simulations performed on the Dawson Cluster under support of NSF grant NSF Phy-0321345. Work also supported by DE-FG02-03-NA00065.

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