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The Effects of Plasma Packets and Local Pump Depletion in Stimulated Raman Scattering[1] B.J. WINJUM, J.E. FAHLEN, F.S. TSUNG, W.B. MORI, UCLA — Stimulated Raman scattering (SRS) for NIF-relevant parameters involves nonlinear, kinetic physics. Previous simulations have focused on the nonlinear physics involved in SRS saturation (such as nonlinear frequency shifts and trapped-particle sideband instabilities) in isolation from and without regard to finite spatial effects. However, SRS is bursty in both space and time, generating plasma wave packets that locally generate bursts of reflected light, deplete incident laser light, and interact with each other through scattered light. The recurrence rate of SRS reflectivity is shown to depend on the nonlinear packet speed and the nonlinear frequency shift of plasma waves in packets. Packets are shown to locally deplete the incident laser energy, but as the packets are etched away and new laser energy propagates past the packet edge without being depleted, packets undergo renewed growth, resulting in new bursts of reflectivity. For interaction lengths that allow several packets to grow and convect simultaneousl, backscattered light from one packet provides an enhanced seed for a nearby packet. This causes the reflectivity to increase as a function of time. We present results for both 1D and 2D simulations.

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