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PIC Simulations of Stimulated Raman Scattering for NIF Scale Lengths and Density Profiles B.J. WINJUM, F.S. TSUNG, W.B. MORI, UCLA — Stimulated Raman scattering (SRS) is a threat to the successful operation of the National Ignition Facility (NIF). Particle-in-cell (PIC) simulations for NIF-relevant plasma conditions have shown SRS to be bursty in space and time, with localized plasma wave packets and bursts of light on the sub- picosecond time scale. However, these simulations have only simulated speckle- size plasmas. Here we present 1D and 2D PIC simulation results for plasmas 1.5 mm in length, T_e = 2.5-3.0 keV, $I_{laser} = 4 - 8 \times 10^{14}$ W/cm^2, and NIF-relevant density profiles over n_e/n_{cr} = 0.09-0.15. Most SRS bursts are again spatially localized within 200 microns and generate sub-picosecond bursts of light whose periodicity is as shown in our previous work. For linear density profiles with scale lengths $\sim$ 3 mm, SRS initially grows at densities of $n_e/n_{cr} \approx$ 0.13-0.14, corresponding to $k\lambda_D \sim 0.30$, while for other density profiles, SRS grows at densities below $n_e/n_{cr} = 0.11$ if the slope in density is sufficiently shallow. The location of SRS growth changes very little as laser intensity increases, although additional bursts start occurring at lower densities. Rescatter is also observed under some conditions. We discuss the range of scattered light wavelengths, the reflectivity levels, and the electron spectra. *Supported under Grants DE-FG52-09NA29552 and NSF-Phy-0904039; simulations were performed on the UCLA Hoffman2 Cluster.

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