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**Saturation of Backward Stimulated Scattering of Laser in Kinetic Regime** L. YIN, B.J. ALBRIGHT, K.J. BOWERS, W. DAUGHTON, H.A. ROSE, Los Alamos National Laboratory — Stimulated Raman (SRS) and Brillouin scattering (SBS) are examined in the kinetic regime using particle-in-cell simulations. Wavefront bowing of electron plasma waves (ion-acoustic wave) due to the trapped particle nonlinear frequency shift is observed in the SRS (SBS) regime for the first time, which increases with laser intensity. Self-focusing from trapped particle modulational instability (TPMI) [H. A. Rose, Phys. Plasmas, **12**, 12318, 2005] is shown to occur in both 2D and 3D SRS simulations. The key physics of SRS saturation is identified as a combination of wavefront bowing, TPMI and self-focusing: Bowing marks the beginning of SRS saturation and self-focusing terminates the SRS pulse, both effects resulting from cancellation of the source term for SRS. Ion acoustic wave bowing also contributes to SBS saturation. Velocity diffusion by transverse modes and rapid loss of hot electrons in regions of small transverse extent formed from self-focusing dissipate the wave energy and increase Landau damping in spite of strong electron trapping that reduces Landau damping initially. The ranges of wavelength and growth rate associated with transverse break-up of the electron plasma waves are also examined in 2D speckle simulations as well as in 2D periodic systems from BGK equilibrium and are compared with theory predictions.

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