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Vlasov simulations of Raman scattering from homogeneous and inhomogeneous plasmas D.J. STROZZI, A. BERS, Mass. Inst. of Tech., E.A. WILLIAMS, A.B. LANGDON, Lawrence Livermore Nat. Lab. — We have performed kinetic simulations of stimulated Raman scattering (SRS) using the 1-D Vlasov code ELVIS [D. J. Strozzi et al., *Comput. Phys. Comm.* **164**, 156 (2003)]. For electron plasma waves (EPWs) with $k\lambda_D > 0.3$ electron trapping increases the backward SRS reflectivity over linear values, as reported by others [H. X. Vu et al., *Phys. Rev. Lett.*, **86**, 4306 (2001)]. The enhancement takes place for both mobile or fixed ions. The electric field (k, ω) spectrum shows the plasma waves are down-shifted in ω from the linear dispersion curve. This downshift is correlated with large EPW amplitude and phase-space vortices in the electron distribution, and is likely due to trapping. The scattered light comes in temporal bursts. Finite-extent pulses of plasma waves are generated near the laser entrance and propagate in the direction of the laser. Forward SRS and Raman re-scatter of back SRS also occur. In an inhomogeneous plasma, the damping reduction due to trapping allows the plasma waves to propagate along the density gradient, rather than developing only near the resonance point. The detuning due to inhomogeneity does not prevent high reflectivity once trapping occurs.
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