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Nonlocal, Kinetic Stimulated Raman Scattering in Nonuniform Plasmas[1] PAVEL KHAIN, LAZAR FRIEDLAND, Hebrew University of Jerusalem, ARKADIY SHAGALOV, Institute of Metal Physics, Ekaterinburg 620219, Russian Federation, JONATHAN WURTELE, UC Berkeley — Excitation of continuously phase-locked (autoresonant) plasma waves in a nonuniform plasma via stimulated Raman backscattering is analyzed with a focus on the kinetic regime ($k\lambda_D \sim 1$). The dominant nonlinear effect in this regime is that of resonant particles and the plasma wave excitation is a nonlocal process involving formation and transport of the electron phase space holes. Whitham's averaged variational principle is applied in studying the coupled plasma, laser pump and seed waves dynamics. A flat-top electron velocity distribution is used as the simplest model allowing a variational formulation within the water bag theory. The corresponding Lagrangian, averaged over the fast phase variable, yields evolution equations for the slow field variables. The adiabatic multiple water bag extension of the theory for application to autoresonant plasma waves in nonuniform plasmas with more realistic initial distributions is also discussed. Numerical solutions of the system of slow variational equations are compared with Vlasov-Ampere simulations.

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