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Electron plasma wave filamentation in the kinetic regime[1] PAVEL LUSHNIKOV, University of New Mexico, HARVEY ROSE, Los Alamos National Laboratory and New Mexico Consortium, DENIS SILANTYEV, University of New Mexico — We consider nonlinear electron plasma wave (EPW) dynamics in the kinetic wavenumber regime, $0.25 < k\lambda_D < 0.45$, which is typical for current high temperature laser-plasma interaction experiments, where k is the EPW wavenumber and λ_D is the electron Debye length. In this kinetic regime, EPW frequency reduction due to electron trapping may dominate the ponderomotive frequency shift. Previous 3D PIC simulations showed that the trapped electron EPW filamentation instability can saturate stimulated Raman backscatter by reducing the EPWs coherence but multidimensional Vlasov simulations [1] are needed to address that saturation in details. We performed nonlinear, non-equilibrium 2D Vlasov simulations to study the EPW filamentation. The initial conditions are created either by external forcing or by constructing the appropriate 1D travelling Bernstein-Greene-Kruskal (BGK) mode. Transverse perturbations of any of these initial conditions grow with time eventually producing strongly nonlinear filamentation followed by plasma turbulence. We compared these simulations with the theoretical results on growth rates of the transverse instability BGK mode showing the satisfactory agreement.

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