Abstract Submitted
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Mixing in phase–space due to the two-stream instability of ion and electron beams propagating in background plasma[1] IGOR KAGANOVICH, Princeton Plasma Physics Laboratory, DMYTRO SYDORENKO, University of Alberta, Edmonton, Alberta, Canada, ERINC TOKLUOGLU, EDWARD A. STARTSEV, RONALD C. DAVIDSON, Princeton Plasma Physics Laboratory — Intense electron or ion beams propagating in plasmas are subject to the two-stream instability, which leads to a slowing down of the beam particles, acceleration of the plasma particles, and transfer of the beam energy to the plasma particles and wave excitations. Making use of the particle-in-cell codes EDIPIC and LSP, we have simulated two-stream instability interactions over a wide range of beam and plasma parameters. Typically, the instability saturates due to nonlinear wave-trapping effects of either the beam particles or plasma electrons. The saturation due to nonlinear wave-trapping effects limits the "mixing" in phase-space and may produce coherent structures in the electron velocity distribution function. For the case of an electron beam, simulations show that the two-stream instability is intermittent, with quiet and active periods. During the active periods of the two-stream instability, the beam interacts with the plasma most intensively at locations where the global frequency of the instability matches the local electron plasma frequency. These intense localized plasma oscillations produce peaks in the velocity distribution function similar to the ones measured in the experiment [1].

[1] L. Xu et al., Appl. Phys. Lett. 93, 261502 (2008).

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