Abstract Submitted
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Formation of coherent structures in turbulent collisionless interaction of electron and ion streams[1] IGOR KAGANOVICH, Princeton Plasma Physics Laboratory — We have studied several two-stream plasma devices where kinetic effects determine plasma self-organization: neutralization of ion beams and electron cloud effects in accelerators, ExB discharges, current ramp-up in tokamaks. In all three cases we observed a formation of turbulent state with embedded coherent structures. The excitation and propagation of electrostatic solitary waves (ESWs) are observed in two-dimensional particle-in-cell simulations of ion beam neutralization by electron injection by a filament. Electrons from the filament are attracted by positive ions and bounce inside the ion beam pulse. Bouncing back and forth electron streams start to mix, creating two-stream instability. The instability saturates with the formation of ESWs [1]. We have also preformed studies of rotating spoke in a Penning discharge [2]. Transport in spoke is turbulent due to well-developed small scale fluctuations. However, structure itself rotates coherently with a well defined frequency. We have also simulated tokamak start-up stage. Simulation results show development of ion acoustic turbulence with ion holes structures embedded [3]. [1] C. Lan and I. D. Kaganovich, Phys. Plasmas 26, 050704 (2019). [2] A. T. Powis, et al., Phys. Plasmas 25, 072110 (2018). [3]. A. Khrabrov, J. Chen, I. D. Kaganovich, this proceedings (2019).

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