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Turbulence and anomalous electron transport in the Electron Cyclotron Drift Instability

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The nonlinear evolution of the The Electron Cyclotron Drift Instability (ECDI) driven by the electron EB drift in partially magnetized plasmas and anomalous electron transport in two dimensions are studied using particle-in-cell (PIC) simulations. PIC simulations were performed for the parameters typical of the Hall-effect thruster in the two-dimensional azimuthal-radial geometry to investigate the role of the boundaries conditions, electric and magnetic field magnitudes, sheath losses and wavenumber-length on the mode development and anomalous electron current. The saturated state of turbulence and resulting anomalous electron current are studied. Nature of the anomalous current and contribution of different wavelength are investigated. It is shown that the magnitude of the anomalous current can be explained as a EB drift of magnetized electrons in fluctuating fields.

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1

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