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Electron distribution fuctions at the diffusion region of reconnection process

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Particle-in-cell simulations of plasma are employed for the study of magnetic reconnection process. We explore details of the diffusive process inside the dissipation region which breaks magnetic fields line. It is well-known both from previous simulations and theoretical estimations that in the case of undriven two-dimensional collisionless simulation such diffusion is provided by the divergence of the electron pressure tensor. Electrons are magnetized far from X-point (gyrotropic particle distribution) but gyrotropy is lost as the magnetic field vanishes near the X-point and electrons behave non-adiabaticly. The study of distribution functions shows their non-Maxwellian behaviour. By means of tracing particles back over some characteristic time scale we separate between inflowing and non-adiabatic populations. Those particles that stay in the vicinity of X-point are considered to be accelerating and trapped, whereas magnetized particles flow in from the outside of diffusion region. We propose a qualitative model of electron pressure anisotropy based on bi-maxwellian nature of distribution function near X-point.