



Particle acceleration in reconnecting current sheets with magnetic islands. II. Particle-in- Cell (PIC) versus Test Particle (TP) approaches

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Magnetic reconnection is an important mechanism to release magnetic energy in various events on the Sun and in the heliosphere and to generate energetic particles by a reconnection electric field in the vicinity of the X-nullpoint. We explore the acceleration of protons and electrons and the ambient plasma feedback to the motion of these particles in current sheets with single and multiple X-nullpoints using PIC and TP approaches. We explore the role of the polarisation electric field based on particle parameters in current sheets with coalescent and squashed magnetic islands. Particle energy spectra and pitch-angle distributions at different stages of acceleration in current sheets with single and multiple X-nullpoints are investigated. The simulated parameters of accelerated particles are investigated for different magnetic field topologies, magnitudes of magnetic field, proton-to-electron mass ratios and ambient plasma densities.