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Transport and energization of particles in turbulent current sheets.

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We consider processes of energization and transport of charged particles in current sheet geometry in the presence of turbulent electromagnetic fields. “Turbulence” could be represented as the ensemble of electromagnetic waves with random phases and power law spectrum. Such configuration (turbulent current sheet) might appear as a result of the development and nonlinear saturation of a various unstable modes of low frequency current sheet instabilities. Interaction of particles with turbulent electromagnetic field results in formation of energetic power law spectrum. If the ensemble of turbulent modes contains only waves with small phase velocities the residence time of particle near the neutral line of current sheet might be substantially enhanced. These two effects could change essentially profiles of plasma density and plasma temperature. Also the dependence between parameters of turbulence, typical time of particle transport and characteristic particle energies were studied. The influence of turbulent energization could be twofold: it produces the heated population of the inner plasma sheet having distributions with characteristic non-exponential suprathermal tails and might be responsible for the formation of accelerated ion beams in the plasma sheet boundary layer. This work was supported by the RFBR 07-02-00319, RFBR 08-02-00407, NSh-472.2008.2.