Geophysical Research Abstracts, Vol. 7, 01290, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01290

Two-stage particle acceleration in flaring atmsopheres

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Electron and proton acceleration by a super-Dricer electric field is investigated in the non-neutral reconnecting current sheet (RCS) with a non-zero longitudinal component of magnetic field ('guiding field', GF). The guiding field is assumed parallel to the direction of electric field and constant within an RCS. The other two magnetic field components, transverse and tangential, are considered vary with distances from the X null-point of an RCS. The proton and electron energy spectra are calculated numerically from a motion equation using the test particle approach for model RCSs with constant and variable densities. In the presence of strong or moderate guiding field protons were found fully or partially separated from electrons at ejection from an RCS into the opposite, 'electron' and 'proton', semiplanes. In the case of a weak guiding field both protons and electrons are ejected symmetrically in equal proportions as neutral beams. The particles ejected from an RCS with a very weak or very strong guiding field have power-law energy spectra with spectral indices about 1.5 for protons and 2.0 for electrons. For a moderate guiding field the energy spectra of electrons ejected into the opposite semiplanes are mixed, i.e. in the 'electon-dominated' semiplane power law ones for electrons and thermal-like for protons while in the 'proton' semiplane they are symmetrically mirrored. We discuss possible instabilities occuring in these scenarios of the primary acceleration and their effect onto the secondary, stochastic, acceleration of the ambient plasma particles.