

Non-adiabatic acceleration of energetic electron by magnetic reconnection

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By using the Geotail spacecraft data, we study plasma heating and acceleration around the magnetic reconnection region. We carry out the superposed analysis of the thermal temperature and energetic electron flux as a function of distance from the X-/O-type neutral line, for the near-Earth, the plasmoid and the distant magnetotail.

What we found are as follows:

1. Electrons are dominantly heated near plasma sheet boundary layer,
2. The peak of energetic electrons flux can be found at outflow region which are away from an X-type neutral region,
3. Energetic electrons flux intensity is much higher in earth ward flow region than in tail ward flow region,
4. Energetic electrons flux intensity is much higher in outer region of plasmoid than O-point.

We also analyze the energy spectrum to discuss non-adiabatic acceleration process. From these analyses, we argue the acceleration of energetic electrons produced by not only X-point but the entire magnetic reconnection region concerning the difference of these three structures.