

Energy transfer in the magnetosphere and substorm-storm relations

Igor I. Alexeev

Institute of Nuclear Physics, Moscow State University, Moscow, Russia

Magnetospheric energy, tail storage energy, and ionospheric Joule dissipation are studied. Ground state of the magnetosphere are determined. Three ways of the solar wind energy input are discussed:

- a. Solar wind MHD-generator energy transfer directly to ionosphere by Region 1 field-aligned currents.
- b. The storage of the energy by tail lobe magnetic field, and than release of it during substorms.
- c. The storage of the energy by the ring current enhancement, and than energy loss by charge exchange of ring current ions and exospheric neutrals.

The solar wind MHD generator is a unique energy source for all magnetospheric processes. The ionospheric Joule heating, auroral particle precipitation, and ring current particle precipitation to atmosphere are the main contributors to the energy losses. The explosive release storage magnetic energy by substorms caused by limitation of regular channels for energy transfer from solar wind to Earth's ionosphere and atmosphere. Model calculations compare with magnetic storms on 9-12 January 1997 and 24-26 September 1998.