TRANSPORT BARRIERS AND DYNAMIC FACTORS: NEW ASPECTS FOR SPACE WEATHER

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The transport barriers at magnetospheric boundaries have a dualistic feature: being very effective in limitation of the momentum transfer, they display the super-diffusive statistical properties. The magnetic field data demonstrate a moderate superdiffusion behavior. In sense of the momentum transfer, the Alfvenic turbulent barrier between moving magnetosheath and magnetosphere, effectively isolates the high- plasma- pressure part of the magnetospheric cusp, from rather fast- flowing (200 km/s) magnetosheath. Contrary to that, several examples from different space missions and different plasma parameters demonstrate the super-diffusive transport character. The individual Alfvenic 'collapsons' in the barrier have similar scale chains to that of the plasma jets with high kinetic energy density, showing mutual interaction features

We show examples from Interball-1 and Cluster with the transport barriers. An inbound Interball-1 magnetopause crossing, being inherently turbulent in the equilibrium case, is best seen from changes of the magnetic field component signs. The ion heating starts namely in the transport barrier and proceeds deeper inward magnetosphere. It agrees with the kinetic energy transformation into the thermal one inside the barrier - the turbulent dissipation of the MSH kinetic energy - as simultaneously with the ion temperature rise, the general velocity component drops from its model prediction.

Fitting the log-Poisson model for 1D most- dissipative structures gives qualitatively similar result, while the ion velocity changes its sign across the barrier. We think that the interacting jets and barriers, accompanying by classic and/ or micro- reconnection, have rather general importance for the plasma physics, and for understanding of turbulence and mechanisms of magnetic field generation. These coherent, nonlinear interacting structures will be further explored in details with ROY and SCOPE Projects of ROSCOSMOS and JAXA.