

## SOME RECENT FINDINGS CONCERNING SUBSTORMS

V.A.Sergeev (*Inst. of Physics, Univ.of St-Petersburg, St.Peteusburg 198904, Russia*)

Permanent features of the tail plasma sheet are the impulsive ( $\sim 1$  min) and localized activations which are evident in many kinds of observations and, possibly, give a major contribution to the plasma and magnetic flux transfer in the tail. Based on ISEE-1/2 spacecraft observations we show that different types of the nightside flux transfer events (NFTEs) are possible. Some of them appear in the very thin current sheets and, possibly, originate due to the impulsive magnetic reconnection process. Some NFTEs are observed in the thick plasma sheet, and often display the reduced plasma content in the compressed (and dipolarized) magnetic tubes. The latter signatures as well as some related ionospheric effects demonstrate that they may be the plasma bubbles. These different types of NFTEs may be the signatures of the same structure which is seen at different stages of its evolution. A few recently published examples gave clear evidence that impulsive magnetic reconnection at  $10-15$  Re may start 2-3 min prior to other signatures of substorm expansion onset. However, the chance to detect that phenomenon is negligibly small since, at this stage, the plasma streaming is very localized in all (x,y,z) directions inside the plasma sheet. An important link to the origin of impulsive reconnection is provided by theoretical results concerning formation of thin, singular current sheets inside the plasma sheet.