On the origin and role of plasma jets with anomalous dynamic pressure in interaction of plasma flow with magnetosphere.

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'Plasma jets' are regularly detected in the magnetosheath (MSH) with preference of occurrence behind the bow shock (BS). The typical duration of the jets is up to several tens of seconds. They appear intermittently, exhibiting as their main feature an increase in the dynamic pressure of 2-3 times above solar wind (SW) and average MSH pressure. The jets are often seen in boundary layers and even outside the BS. Some of the high-dynamic pressure jets skew the magnetopause (MP), being able to drive secondary reconnection at the deformed MP and penetrate in/ under the mantle or low latitude boundary layer. Others are reflected by the rising magnetospheric field. Third ones carry the momentum excess during MSH transition towards a state of smaller dynamic pressure, or they appear as a result of transient MSH reactions on SW discontinuities. The typical jet velocity approaches that of MSH sonic one. Highly supersonic jets are found in MP boundary layers. These intermittent/ transient flow concentrations are opposite to the predictions of gasdynamics and MHD for the transformation of SW kinetic energy into thermal energy at the BS since in the jets the dynamic pressure is rising instead of falling. We infer supporting of the local energy conservation by the standing electric structures, stored the energy at intensity maximums in the interference pattern, formed by the incident on and reflected from the geomagnetic obstacle waves. We suggest that the jets, averaged in the space instead of time domain, must be considered in the flow balance of the MSH; it would provide converging with the simulation predictions. Recent simulations of Alfven wave filamentation in Hall-MHD will also be presented that show the formation of thin magnetic tubes, their disruption and the onset of a hydrodynamic regime with intense plasma jets, potential sources of further destabilization of the plasma. Four jet types are discussed versus possible mechanisms of their generation, including also inertial drift, 3- wave decay, pressure gradients, charged current sheets and reconnection. As the latter is widely studied, we concentrate on the other mechanisms, which dominate at list in MSH and ahead the MP. We proceed in the jet studies taking advantage of Cluster, Interball-1, Polar and Geotail data and their comparison with simulations. The jets occur to be nonlinear structures detected for decades. But understanding of their

origin and fundamental role can essentially modify the approach to the SW- magnetosphere interaction and should also shed light on heliospheric and astrophysical plasma streamlinings. This work was supported by ISSI and INTAS grant 03-50-4872.