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Analysis of anisotropic turbulence behind quasi-perpendicular and quasi-parallel shocks based on THEMIS mission observations

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Turbulence is an important feature of dynamic plasmas in space environments, not only in the solar wind, but also in the magnetosheath where the flow of the solar wind plasma is slowed down by the bow shock surrounding the Earth's magnetosphere. It is expected that turbulence is intermittent in the magnetosheath, but that it differs somewhat behind the quasi-perpendicular and quasi-parallel shocks, i.e. behind regions where the interplanetary magnetic field lies perpendicular and parallel to the normal to the shock surface. Using data acquired from the THEMIS spacecraft, we have recently obtained evidence for the anisotropy of intermittent turbulence in the magnetosheath. In particular, we have shown that for some cases of very strong shocks, with very high Alfvén Mach numbers, and high plasma beta, i.e. when the thermal pressure dominates the pressure of the magnetic field, the fluctuations of parameters of the magnetized plasma exhibit substantial deviations from normal distributions in the directions transverse to the local ambient magnetic field, while along this field the plasma is rather close to equilibrium. Here we will present a more detailed analysis of the intermittent turbulence in the magnetosheath as a function of shock characteristics, taking into consideration the angle between the direction of the normal to the shock and the direction of the local magnetic field.

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