

Polarization analysis of the magnetosheath turbulence observed by Geotail

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The magnetosheath is the transition region between the solar wind and the magnetosphere. Turbulences in the magnetosheath are important for understanding the whole process of energy and mass exchanges of the solar wind and magnetospheric plasmas. However, the turbulences are so complicated; they evolve in nonlinear processes with various wave modes, including ion cyclotron / Alfvén, whistler / magnetosonic, and mirror modes.

We performed polarization analysis on the magnetic turbulences to reveal their nature and associations with ambient magnetosheath processes. The turbulence exhibits different polarizations with respect to the observed frequency even at the same time, for example, a broadband turbulence in low frequency range ~ 0.1 -1 Hz consists of mainly left-hand polarized in higher frequency range, right-hand polarized in middle frequency range, and left-hand polarized in lower frequency range. These features suggest that the magnetosheath turbulence can involve different wave modes and/or different propagation directions.