

Wave Propagation Pattern in the Magnetosheath

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Magnetosheath waves are believed to be a mixture of mirror mode structures, Alfvén waves, upstream waves processed through the shock, and so on. It is generally difficult to determine wave propagation directions in the plasma rest frame, as single spacecraft observe only Doppler shifted waves and can not distinguish between temporal and spatial variations.

Multi-point measurements of Cluster spacecraft, however, have a potential to achieve the Doppler shift correction and to determine the wave propagation directions in the plasma rest frame.

The propagation pattern is investigated on a statistical basis using about 200 wave events provided by Cluster.

The majority of the waves exhibit tailward and inward (toward the magnetopause) propagation, accompanied by anti-correlated plasma density and magnetic field fluctuations.

This pattern fits well with the density gradient pattern of Spreiter's hydromagnetic sheath model, suggesting that the waves are the drift mirror mode.