



Kinetic Turbulence in the Terrestrial Magnetosheath: Cluster Observations

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We present a first statistical study of subproton and electron scales turbulence in the terrestrial magnetosheath using waveform data measured by the Cluster/STAFF Search Coil Magnetometer (SCM) in the frequency range [1, 180] Hz. It is found that clear spectral breaks exist near the electron scale, which separate two power-law like frequency bands referred to as the dispersive and the electron dissipation ranges. The frequencies of the breaks f_b are shown to be well correlated with the electron gyroscale ρ_e rather than with the electron inertial length d_e . The distribution of the slopes below f_b is found to be narrow and peaks near -2.9, while that of the slopes above f_b is found broader, peaks near -5.2 and has values as low as -7.5. This is the first time that such steep power-law spectra are reported in space plasma turbulence. These observations provide strong constraints on theoretical modeling of kinetic turbulence and dissipation in collisionless magnetized plasmas.