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Magnetosheath Turbulence at MHD Scales: A Statistical Study

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Turbulence is ubiquitous in space plasmas, such as terrestrial magnetotail and magnetosheath, solar wind, or the interstellar medium. In the solar wind, it is well established that at MHD scales, the magnetic energy spectra generally follow the so-called Kolmogorov's spectrum $f^{-5/3}$. In the magnetosheath, *Alexandrova et al.* [2006] observed a Kolmogorov-like inertial range in the frequency range $f < f_{ci}$. In this study, we used three years data from the Cluster mission to statistically investigate the existence of the Kolmogorov inertial range in the whole magnetosheath, including flanks and subsolar regions. Statistical results show that most spectra are shallower than the Kolmogorov one, and have a scaling $\sim f^{-1}$recalling the energy containing scales of solarwind turbulence. These spectra were found to be populated by uncorrelated fluctuations. The Kolmogorov scaling is observed only away from the bock shock and in the flanks region. These results suggest that random-like fluctuations are generated behind the shock, which reach a fully developed turbulence state only after some time corresponding to their propagation (or advection) away from the shock. At kinetic scales no dependence of the turbulence scaling on the location in the magnetosheath was found.