ON MAGNETIC FLUCTUATION SPECTRA IN THE SOLAR WIND AND THE INFLUENCE OF MODE DISPERSION

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Magnetic fluctuation power spectra in the solar wind are commonly observed to have a power law form with a spectral index $s = 5/3$ at frequencies lower than about 1 Hz. This characteristic feature of magnetic fluctuation spectra defines what is called the inertial range and may be described, in wavenumber space, by Kolmogorov diffusion. For higher frequencies, it has been suggested that collisionless damping of Alfvén and magnetosonic waves leads to steeper power laws; this regime is sometimes labeled as the dissipation range. Here we argue, based on numerical calculations, that it is more likely that the observed steeper power laws result from an increase in the wavenumber diffusion rate caused by whistler-like dispersion than from collisionless damping. The calculations lead to the prediction, that this broken power law feature of magnetic fluctuation spectra is only observable in low-β_p plasmas.