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Parallel and Perpendicular Cascades in Solar Wind Turbulence

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MHD-scale fluctuations in the velocity, magnetic, and density fields of the solar wind are routinely observed. The evolution of these fluctuations, as they are transported radially outwards by the solar wind, is believed to involve both wave and turbulence processes. The presence of an average magnetic field $\langle \mathbf{B} \rangle_{\rm local}$ has important implications for the anisotropy of the fluctuations and the nature of the turbulent wavenumber cascades in the directions parallel and perpendicular to $\langle \mathbf{B} \rangle_{\rm local}$. In particular, if the ratio of the rms magnetic fluctuation strength to $\langle \mathbf{B} \rangle_{\rm local}$ is small, then the *parallel wavenumber cascade is weak* and there are difficulties in obtaining a cascade in frequency. The latter has been invoked in order to explain the heating of solar wind fluctuations (above adiabatic levels) via energy transfer to scales where ion-cyclotron damping can occur.

We will discuss these distinct types of cascades and their roles in the evolution of solar wind fluctuations.

Keywords: turbulence, cascades, solar wind

References

[1] R. J. Leamon, W. H. Matthaeus, C. W. Smith, G. P. Zank, D. J. Mullan, and S. Oughton, *Astrophys. J.* **537**, 1054 (2000).

[2] W. H. Matthaeus, S. Ghosh, S. Oughton, and D. A. Roberts, *J. Geophys. Res.* **101**, 7619 (1996).

[3] S. Oughton, S. Ghosh, and W. H. Matthaeus, *Phys. Plasmas* **5**, 4235 (1998).