Very high frequency temperature spectrum in the solar wind

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Abstract

We present study of the spectral properties of plasma turbulence both at magnetohydrodynamic and kinetic scales and compare theoretical results with recent high frequency observations of the solar wind perturbations performed using measurements of the Bright Monitor of the Solar Wind on board the Spektr-R spacecraft. We show that observed features of the thermal velocity power spectrum significantly differs from the theoretical expectation and present explanation of this inconsistency. We show that if the method of derivation of the plasma parameters from the Faraday cup measurements assumes isotropy of the temperature, then the thermal speed perturbations are dominated by perturbations of the magnetic field. As a result, features of the spectrum of the thermal speed are similar to the incompressible Alfvenic component. Based on this finding we present novel conclusions about perturbation dynamics in the solar wind.