Characteristics of turbulence in transition regions near large-scale boundaries in the solar wind.

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Fluctuations of solar wind parameters can be strongly affected by the presence of sharp boundaries between different large-scale structures. Turbulence cannot develop freely across such boundaries, just as it could in the undisturbed solar wind. It can lead the growing of fluctuation level and changes in shape and properties of turbulent cascade too. The compression regions, for example, Sheath regions before magnetic clouds, and CIR regions (the compression areas between fast solar wind from coronal holes and slow solar wind from coronal streamers), are typical examples of such transitions. Here we present the analysis of turbulence spectrum changes during crossings of Sheath and CIR regions. We use unique high time resolution plasma measurements by BMSW instrument at Spektr-R spacecraft in order to consider both MHD and kinetic scales of turbulent cascade. We analyze the base properties of turbulence spectra: spectral power and slopes at corresponding scales, break frequency between scales, and also shape of spectra. We began by examining of the case study crossings of the transition regions and then compared statistically the spectral properties in such regions with the same ones in the undisturbed solar wind. We have shown that spectra fall nonlinearly at kinetic scales and become steeper with growing of fluctuation level in transition regions, at the same time the slope of spectra at MHD scale remains almost Kolmogorov. Withal some interesting features can be observed in the vicinity of the break between characteristic scales during crossing of transition regions. The given results reveal the lack of energy balance between MHD and kinetic scales, and can indicate the intensification of dissipation processes and the additional plasma heating in the transition regions. The work is supported by Russian Science Foundation grant 16-12-10062.