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Role of shell distribution instabilities in formation of parallel and perpendicular spectra of the solar wind turbulence VITALY GALINSKY, VALENTIN SHEVCHENKO, UCSD — Alfven waves propagating along the local background magnetic field pitch angle scatter particles into shell-like distribution. Results of a study of dispersive Alfven modes propagating outward from the Sun in streaming inhomogeneous plasma for the inner heliosphere ($\leq$ 1AU) region show that an interplay of macro scale and resonant wave-particle instabilities of shell-like distribution combined with nonlinear wave-wave interaction of shear and kinetic Alfven branches is responsible for formation of both parallel and perpendicular spectra of the solar wind turbulence. The study does not use any of the available nonlinear models of imbalanced incompressible MHD turbulence but nevertheless correctly reproduces several peculiarities of the solar wind turbulence spectra that currently generate significant difficulties for the solar wind MHD turbulence models. Our approach correctly explains the fine structure of parallel fluctuations, quantitatively describes the prevalence of a turbulent energy in perpendicular ($k_\perp$) scales over energy contained in propagating parallel ($k_\parallel$) to the local magnetic field perturbations. The radial dependence of the turbulent spectral break is also predicted rather well.

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