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Solar wind density spectra around the ion spectral break

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The paper presents a large statistical analysis of ≈ 5800 frequency spectra of the solar wind density fluctuations in the range of 0.001–5 Hz (corresponding spatial scales 100–5×10^5 km). The analysis confirms that the spectrum consists of three segments divided by two breakpoints and that both breakpoint locations are controlled by the gyrostructure frequency, f_g defined as a ratio of the solar wind bulk speed and thermal ion gyroradius. Each from three segments can be described by a power-law function with a spectral index where the first segment corresponding to the MHD scale is followed by a plateau, and the third segment can be associated with kinetic turbulence. As it follows from the statistics, the values of spectral indices depend on the density fluctuation level; its increasing level leads to steepening of each segment. The index -1.8 can be typically found at MHD scales and averaging of spectra in the frequency domain leads to the index of $-8/3$ at kinetic scales, whereas averaging in frequencies normalized to f_g provides a value of $-7/3$.