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Modeling fluctuations of solar wind parameters with heavy tails

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Recent approach for heavy tail time series models are applied to study the intermittency and statistical properties in solar wind turbulence and interplanetary magnetic field fluctuations.
The probability distribution functions (PDFs) of fluctuations of solar wind plasma parameters and interplanetary magnetic field are investigated for in-situ data recorded by Ulysses between 2001-2003.
Analysis of the magnetic field magnitude and magnetic field energy density fluctuations shows that at larger scales these fluctuations are less intermitent than at small scales, their behavior at different scales being quantitatively described by the PDFs.
The scale dependence of ion density, velocity magnitude, magnetic field magnitude, and magnetic field energy density of observed Ulysses PDFs are well fitted for different time lags by the numerical solutions of space-time fractional diffusion equations.
The PDFs of the magnetic field intensity and magnetic field energy density present non-Gaussian properties on small time scales, and uncorrelated features at large scale.