KINETIC EFFECTS IN SOLAR WIND LOW FREQUENCY TURBULENCE: VLASOV SIMULATIONS VS DATA ANALYSIS

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Kinetic plasma processes have been investigated in the framework of solar wind turbulence, using Hybrid Vlasov-Maxwell (HVM) simulations. Statistical analysis of spacecraft observations data relates proton temperature anisotropy $T_\perp/T_\parallel$ and parallel plasma $\beta_\parallel$, where subscripts refer to the ambient magnetic field direction. This relationship has been recovered using an ensemble of HVM simulations in 2D-3V and 3D-3V phase space configurations. By varying the plasma parameters, such as the plasma beta and the fluctuation level, the simulations have allowed us to explore distinct regions of the parameter space given by $T_\perp/T_\parallel$ and $\beta_\parallel$, thus reproducing the solar wind subdatasets. Both simulations and solar wind data suggest that temperature anisotropy is associated with intermittent events, characterized by high gradient in magnetic and velocity fields and in the density. The connection between non-Maxwellian kinetic effects and various types of intermittent structures may represent a key for understanding the complex nature of plasma turbulence.