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# Talk Compressible MHD and kinetic scale turbulence in the near-Earth space: theoretical modeling and recent ins-situ spacecraft observations

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The near-Earth space provides a unique laboratory to explore turbulence dynamics in magnetized plasmas thanks to the availability of high quality data from various orbiting spacecraft. In comparison with the solar wind, plasma turbulence in the magnetosheath remains far less explored. This is essentially due to the complexity of the magnetosheath dynamics that challenges any "realistic" theoretical modeling of turbulence in it. This complexity is due to various reasons such as the confinement of magnetosheath plasma between two dynamical boundaries, namely the shock and the magnetopause; the highly variable solar wind pressure that "shakes" and compresses continuously the magnetosheath plasma; and the presence of large density fluctuations and temperature anisotropies that generate various instabilities and plasma modes. I will discuss two major features of plasma turbulence in the solar wind and the magnetosheath both at MHD and sub-ion scales: its scaling laws and its energy dissipation rate. The latter is estimated using exact laws derived for compressible MHD and Hall-MHD theories applied to numerical simulations and in-situ observations from the Cluster, Themis and MMS spacecraft. I will discuss some implications of the results on modeling of dissipation at kinetic scale and their possible application to distant astrophysical plasmas non accessible to in-situ observations.

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