MHD TURBULENCE IN CORONAL MAGNETIC STRUCTURES: MODELS AND OBSERVATIONS

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High resolution numerical simulations and solar wind data analysis have allowed for a huge progress in our understanding of MHD turbulence. We are now able to set up a consistent and convincing view of the main properties of MHD turbulence, also in those situations, like in solar corona, where in situ observations are not available. Using this knowledge, a model to describe injection, due to foot-point motions, storage and dissipation of MHD turbulence in coronal loops, is built. Numerical simulations show that injected energy is efficiently stored, in a resonant way, in the loops, where a significant level of magnetic and velocity fluctuations is obtained. Nonlinear interactions give rise to an energy cascade towards smaller scales where energy is dissipated in an intermittent fashion. The statistical analysis on the intermittent dissipative events compares well with all observed properties of nanoflare emission statistics. Moreover space observations of coronal lines broadening during flare occurrence suggest that unresolved non-thermal velocity rises well above the background level before the start of the flare defined as the start of HXR emission. Analyzing numerical simulations, it is shown that the occurrence of high values of the large scale fluctuating velocity can represent an efficient trigger to non-linear intermittent turbulent cascade and then to the generation of a burst of dissipated energy. The numerical results of the model support the view that large velocity fluctuations represent the flare trigger rather than the result of the later energy deposition.