The Expanding Box Model (EBM) is a framework for numerical simulations of
turbulence that is able to capture the effect of spherical expansion while
retaining the resolution for turbulence dynamics. We have recently shown that
it can reproduce several aspects of turbulence anisotropy, namely the component
anisotropy and the structure function anisotropy with respect to the local mean field.
We discuss now the role of expansion in the fast solar wind with strongly Alfvénic fluctuations, i.e., with strong magnetic/velocity correlation..
These conditions unfavour the development of a turbulent cascade, yet fluctuations display a well developed spectrum.
Moreover, the correlation decreases with distance, at odd with the asymptotic
behavior of incompressible turbulence that instead leads to an increase of
correlation.
By numerically solving the full MHD equation in the expanding solar wind
(EBM), we show that
1) the dominant Alfvénic fluctuations evolve into a turbulent spectrum, i.e. a
cascade develops,
2) the decrease of energy with distance of the Alfvénic component matches
the observed decrease,
3) the minority species have constant energy, as found in observations.
We then discuss how these properties are linked to expansion and how they depend on the expansion rate.