Phase correlation of large amplitude MHD waves observed by Geotail

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Large amplitude MHD turbulence is common in space plasma. They can be written as a superposition of Fourier modes with characteristic frequency, amplitude, and phase. Nonlinear interactions between the Fourier modes are likely to produce finite correlation among the wave phases.

We analyze Geotail magnetic field data in the solar wind in order to identify whether the nonlinear interactions between the waves is in progress. Starting from a piece of observed field data (OBS), we make the phase-randomized surrogate (PRS), and the phase-correlated surrogate (PCS). Then we characterize statistics of three sets of data by a fractal analysis. We will report initial results for various turbulence levels and spectrum types.