EVALUATION OF PHASE COHERENCE AMONG MHD WAVES

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Large amplitude MHD waves are commonly found in the solar wind, in particular, in the earth's foreshock. The waves within this region exhibit various peculiar waveforms, suggesting that nonlinear interaction between the waves is in progress (e.g., SLAMs, shocklets, etc). When we Fourier analyze such data, usually more emphasis is placed on the power spectrum than the phase distribution of wave modes, although the latter contains important information on nonlinear coupling between the eigenmodes (e.g., synchronization of phases).

We have recently developed a method to quantitatively evaluate the phase

coherence of a given time series data, by comparing structure functions of original data and its phase-shuffled surrogates. In this presentation we discuss critically some fundamental properties of this method, and show how one should determine such basic parameters used in the method as the data length for getting the optimum results.

Furthermore, we discuss some extensions of the method, including the analysis of 2-dimensional data obtained by simulations.