A Study on the Effect of the Number of Snapshots for Averaging and the Noise Level on the Estimation Accuracy in Direction Finding

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The analysis of plasma waves obtained from in-situ observations by scientific satellites is an effective method to investigate the plasma environment in the inner magnetosphere. Direction finding of plasma waves provides important information for understanding not only local plasma environment but also the global features of the inner magnetosphere.

In the direction finding, information on the amplitude and phase difference of the electromagnetic field extracted from the correlation matrix called spectral matrix is used. The quality of the information from the spectral matrix depends on the number of snapshots for averaging, the noise level on the electromagnetic sensor, and so on. What is more, the accuracy and the robustness of the estimated result about direction finding depends on the a priori information such as the number of waves, propagation mode, plasma density and geomagnetic field intensity.

In this study, the effect of the number of snapshots for averaging and the level of noise on the electromagnetic field sensors on the estimation accuracy of the direction finding is verified.

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