3D Electromagnetic Particle Simulations about the Lowe Frequency Component of BEN based on statistical analysis of EFD data

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PIC simulations revealed that ESW (Electrostatic Solitary Waves) are generated from electron beam instabilities. ESW correspond the upper frequency component of BEN (Broadband Electrostatic Noise) which is frequently observed in space plasma. The generation mechanism of the low frequency component of BEN, however, is still unexplained. To clarify whether such low frequency waves are generated, we made statistical analysis on generation conditions of low frequency component of BEN observed by Electric Field Detector (EFD) onboard Geotail spacecraft. We detected low frequency component of BEN automatically from EFD data, and made an occurrence frequency distribution of these waves. Low frequency component of BEN are observed in PS and PSBL region in the magnetosphere.
According to our statistical analysis, the low frequency component of BEN have two different types of spectrum. These two types of waves are observed in the different region and plasma conditions, therefore, we assumed that there exist two different waves as the low frequency component of BEN. Based on this assumption, we are going to make further analysis on generation conditions of these two types of low frequency component of BEN, and perform a series of three-dimensional electromagnetic particle simulations with different parameters to clarify the generation process of the low frequency component of BEN.

