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3-dimentional electromagnetic particle simulations about the low frequency component of Broadband Electrostatic Noise

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According to PIC simulations, 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.
We studied several plasma parameters at the time when low frequency component of BEN were observed, and found that these waves were observed in the conditions with low ion density and strong B field in these regions. Then, based on these statistical analysis, we are going to perform a series of three-dimensional electromagnetic particle simulations with different parameters on PC-Cluster built in our laboratory.

Keywords: particle simulations, low frequecy component of BEN, Geotail, EFD