Evaluation of WPIA method on generation process of chorus emissions by full-particle simulations - toward the ERG satellite

Mitsuru Hikishima[1]; Yuto Katoh[2]; Yoshiharu Omura[3]; Hirotsugu Kojima[3]; Yoshizumi Miyoshi[4]; Takayuki Ono[2]; Yuto Katoh WPIA discussion group[5]

[1] Grad. Sch. Sci., Tohoku Univ.; [2] Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.; [3] RISH, Kyoto Univ.; [4] STEL, Nagoya Univ.; [5] -

The ”Wave Particle Interaction Analyzer (WPIA)” is a new instrumentation measuring interactions between plasma waves and energetic electrons directly and quantitatively in space plasmas [Fukuhara et al., EPS 2009], which will be installed as a software function in the ERG satellite (Energization and Radiation in Geospace). The WPIA measurements have been realized by conducting various types of calculations performed within a characteristic time scale of wave-particle interactions. In the WPIA, we use the wave vector and each velocity vector of plasma particles respectively measured by wave and particle instruments onboard spacecraft. One of the methods of the WPIA is to evaluate a transition of energy exchange by calculating E dot v, where E and v are the electric field, the velocity of plasma particles, respectively. The WPIA has a capability of the direct measurement of the phase relation between waves and particles which cannot be obtained in conventional particle measurements and data processing. The measurement in the WPIA is one of the prime targets to find the resonant interactions of energetic electrons and whistler-mode chorus emissions in the ERG mission.

To evaluate the feasibility of the WPIA method in wave-particle interactions, we analyzed a dataset in the simulation of whistler-mode chorus generation by the electron hybrid code [Kitahara et al., in preparation]. In the present study, we use wave and particle data in whistler-mode chorus generations reproduced by the full-particle code. By applying the WPIA method on the whistler-mode chorus generations emerging from different conditions, we evaluate the feasibility of algorithm of the WPIA method.