

Statistical evaluation of the fluctuation of the WPIA analysis

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”Wave-Particle Interaction Analyzer (WPIA)” is a new type instrument proposed by Fukuhara et al. (Earth Planets Space, 2009) for the measurement of interactions between plasma waves and energetic electrons directly and quantitatively in space plasmas. In the WPIA, we use the wave vector and each velocity vector of plasma particles respectively measured by wave and particle instruments onboard a spacecraft. One of the methods of the WPIA measurement is the evaluation of the summation of $q\mathbf{E} \cdot \mathbf{v}$, corresponding to the Joule heat, where \mathbf{E} , \mathbf{v} and q are the electric field, the velocity and charge 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 by conventional particle measurements and data processing. The WPIA will be installed in the ERG satellite (Energization and Radiation in Geospace). In the ERG mission, one of the prime target is resonant interactions of energetic electrons and whistler-mode chorus emissions. In this study, we discuss about the feasibility and capability of the method of WPIA measurement based on the results of WPIA analysis of the simulations of whistler-mode chorus emissions.

Keywords: Wave-Particle Interaction Analyzer (WPIA), wave-particle interaction, whistler-mode chorus emission, radiation belts, ERG