

ERG 衛星搭載波動粒子相互作用解析装置 Wave-Particle Interaction Analyzer onboard ERG satellite

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One of the key targets in the ERG mission is to investigate wave-particle interactions in the terrestrial radiation belt. The study of wave-particle interactions has been conducted by examining the correlation of wave spectra/waveforms and plasma energy spectra/velocity distributions which are observed by plasma wave receivers and particle detectors, independently. The disadvantage of this method is the difference of the time resolutions of plasma wave data and plasma data. Furthermore, the quantitative data analysis is difficult in this method. In order to overcome these disadvantages, we proposed the new method for the direct measurement of wave-particle interactions. It is addressed by Wave-Particle Interaction Analyzer (WPIA). The WPIA makes use of each pulse which shows the detection of particles in plasma detectors. The WPIA calculates E.V at each timing of particle detection by multiplying instantaneous electric field wave vector. Since E.V is equivalent to time differential of plasma kinetic energy, the quantitative energy flow among waves and plasmas can be obtained using the WPIA. The current status of developing the WPIA is under considering the appropriate algorithm using computer simulations. The computer simulation reproduces the generation process of the chorus emission and the acceleration of electrons by the chorus emission. The algorithm based on the computer simulation will be examined using the breadboard of the MDP designed for the ERG emission.

In the present paper, we introduce the principle of the WPIA and show the current status of its development towards the ERG satellite.

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