

R006-73

Zoom meeting B : 11/4 PM2 (15:45-17:30)  
17:15-17:30

## Onboard impedance measurement of the wire-probe antennas aboard Arase

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The Plasma Wave Experiment (PWE) is one of the science instruments aboard Arase to measure the electric field and magnetic field in the inner magnetosphere. PWE consists of three receivers: Electric Field Detector (EFD), Waveform Capture and Onboard Frequency Analyzer (WFC/OFA) and High Frequency Analyzer (HFA), and two sensors: a couple of dipole wire-probe antenna (WPT) and a tri-axis magnetic search coil (MSC).

It is well known that the impedance of the electric field antenna in space change depending on the plasma parameters (e.g., plasma density, temperature, etc.) We have developed the onboard antenna impedance measurement system (Onboard SoftWare CALibration function; SWCAL) and implemented as a part of the onboard software of the PWE. The system uses multiple square waves as the calibration signals. It performs fast Fourier transforms (FFT) on the signal output from the A/D converters and collects frequency responses of the fundamental and that of the odd-numbered harmonics below 32768 Hz. The transfer function can be derived on the ground by dividing observed responses into the reference square wave in the frequency domain. The antenna impedance can be derived by comparing the observed total-circuit response (including the effect of the antenna impedance) and the internal-circuit response.

We have operated SWCAL measurements more than 6000 times since Arase was launched. In this study, we introduce the technique of the SWCAL function and report results from the statistical survey of the SWCAL measurements. We successfully obtained a clear relationship between the measured antenna impedance and the ambient plasma density derived from the upper hybrid resonance (UHR) frequency measurement. This result provides an important factor for the precise calibration of observed electric field data.