

R010-08
B会場：11/25 AM1 (9:15-10:45)
9:15~9:30:00

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Modeling of plasma environment for spacecraft surface charging analysis in the inner magnetosphere

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Spacecraft surface charging is caused by the accumulation of electrostatic charge on a spacecraft's external surfaces due to interactions with the surrounding space environment, which includes ambient plasmas and solar radiation. This can lead to spacecraft anomalies resulting from electrostatic discharges (ESD) that potentially damage electronic components. We investigated surface charging levels and plasma energy flux data in the inner magnetosphere using the Van Allen Probes. The analysis indicates that the integral flux of high-energy electrons (>8 keV) serves as a useful index for the necessary conditions for surface charging in the inner magnetosphere, in line with previous studies conducted in geostationary orbit. However, sufficient conditions also depend on the influence of photoelectron and secondary electron emissions, which vary based on the parameters of the spacecraft's surface materials. Therefore, the rate of low-energy electron flux (hundreds eV) that generates secondary electron emission is important for evaluating surface charging levels. We present the results of a statistical analysis of the plasma environment in the inner magnetosphere and discuss how to model the plasma environment for surface charging analysis.