

# Effect of the counter electrode on the Langmuir probe measurement

# Manabu Shimoyama[1]; Yushi Tsukada[2]; Yoriiji Okabe[3]; Koh-ichiro Oyama[4]

[1] Earth and Planetary Sci., Univ. of Tokyo; [2] Earth and Planetary Sci., Tokyo Univ; [3] JAXA/ISAS; [4] ISAS

Electron temperature( $T_e$ ) that is much higher than possible neutral gas temperature( $T_n$ ) has been frequently observed by the in-situ measurement using Langmuir probe in lower E region. However it conflicts with the theoretical consideration because neutral density is about  $10^6$  higher than electron density and therefore  $T_e$  should become equal to  $T_n$ .

Two possibilities for this discrepancy can be considered.

- 1) Some energy sources exist and then electron is actually heated.
- 2) The high  $T_e$  is due to measurement method.

In this study we assume the resistance of counter electrode sheath is not negligible compared with that of probe sheath.

The experiment to validate the effect of counter electrode sheath is as follows. At first a model rocket which has Langmuir probe is set in the chamber in order to simulate the flight environment. From the idea that resistance of counter electrode sheath depends on the frequency of sweep voltage, the effect of counter electrode sheath on current-voltage characteristic is studied.

The result shows that 20-40% increase of probe current arise as the sweep frequency become higher, which indicates the possibility that electron temperature is affected by the counter electrode sheath.