Geophysical Research Abstracts
Vol. 19, EGU2017-14831, 2017
EGU General Assembly 2017

The electron and the ion density characteristic near the F ring by Cassini/RPWS/LP

Michiko Morooka (1), Jan-Erik Wahlund (1), David Andrews (1), Sheng-Yi Ye (2), and William Kurth (2)

(1) Swedish Institute of Space Physics (IRFU), Uppsala, Sweden (morooka@irfu.se), (2) Department of Physics and Astronomy, University of Iowa, Iowa City, IA, USA

Cassini observations revealed that there are a large amount of nm and μm sized dust grains and their electrical interaction with the surrounding plasma near the moon Enceladus and the E ring. In this region, the small grains are negatively charged by attaching the electrons, resulting the unbalance in the ion and the electron densities (the ion density higher than the electron density). Similar type observations are expected near the faint F and G ring that are composed of small grains. During the grand finale, from December 2016, Cassini has been orbiting Saturn with closest approach just outside the F ring. We will show the electron and ion densities of those orbits obtained by the Langmuir probe onboard Cassini (RPWS/LP). Preliminary results showed: 1) both the electron and the ion density enhancement occurred near the equator (Z = $\pm 0.5 R_S$). 2) The electron densities at the equator are about the order of 1 cm^{-3} (varies from 2 to 8), while the ion densities are an order of magnitude larger than the electrons up to 300 cm^{-3}. 3) The electron density depletion has been observed centered at the equator around ± 0.05 R_S in Z. Coincide this region, the LP sweep current noise due to the dust grain's hitting the probe were observed. On the other hand, the peak of the electron density seems to be located slightly northward above the equator at $\sim$0.05 R_S. 4) One of the events showed a local electron density enhancement near the L-shell at $L = 3$. The obtained characteristics are similar to what have been found in the E ring near the Enceladus orbit. In the E ring, the electron density enhancement region was centered at the equator in Z $\pm$ $\sim 0.5 R_S$, the electron bite out occurred at Z = $\pm 0.045 R_S$, and the electron density peaks were somewhat higher in the northern hemisphere. A possible explanation for the location differences in the charged dust density peak and the plasma density peak can be due to that the magnetic equator is located slightly north (+0.04R_S) of the equator of the rings. We plan to show the electron and the ion densities during the Cassini F ring campaign and compare the results from the E ring as well as the density profiles along the equator.