Energy dependence of elastic collisions between magnetospheric electrons and neutral H2O molecules in the Enceladus torus

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Water group neutrals (H_2O, OH, and O) in Saturn's inner magnetosphere play the dominant role in loss of energetic electrons and ions because of abundance of the neutrals [e.g., Paranicas et al., 2007,2008; Sittler et al., 2008]. Previous studies suggested that the neutral cloud originated from Enceladus contributes to loss processes of plasma in the magnetosphere. However, little has been reported on a quantitative study of the electron loss process due to electron-neutral collisions. Conducting one dimensional test-particle simulation, Tadokoro et al. [2014] examined the time variations of equatorial pitch angle distribution and electrons within loss cone through 1 keV electron pitch angle scattering due to electron-H_2O elastic collisions around Enceladus when the electron flux tube passes the region of the dense H_2O molecules in the vicinity of Enceladus (˜380 sec). The result showed that the electrons of 11.4 % are lost in ˜380 sec. The estimated loss rate was twice faster than the loss time under strong diffusion. Assuming the uniform azimuth H_2O density structure in the torus, they also estimated the electron loss rate of 33 % during one corotation. Next remaining issue is a calculation of energy dependent electron loss rate. We show the loss rate of electrons with 500eV-50keV and the comparison of the loss rate between the high (in the vicinity of Enceladus) and low (in the Enceladus torus) H_2O density regions. We also show energy dependent loss rate with error bars by conducting the calculation several times.