



A new flapping mechanism of Earth's magnetotail current sheet: inferred from Cluster observations

Jiawei Gao (1), Zhaojin Rong (1), Yihui Cai (1), Anatoli Petrukovich (2), Tony Lui (3), Chao Shen (4), Yong Wei (1), and Weixing Wan (1)

(1) Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China (rongzhaojin@mail.iggcas.ac.cn), (2) Space Research Institute, Russian Academy of Sciences, Moscow, Russia, (3) Applied Physics Laboratory, The Johns Hopkins University, USA, (4) Harbin Institute of Technology, Shenzhen, China

The flapping motion of magnetotail current sheet is a common dynamic phenomenon, which is widely observed in planetary magnetotails. Previous studies about the Earth's magnetotail suggest that the flapping motion has two types, i.e. the kink-like flapping that can propagate as waves towards both flanks, and the steady flapping that moves up and down but does not propagate or flap as stationary waves. However, the flapping mechanism remains unclear though some models or theories about the kink-like flapping have been proposed. In this paper, with the multi-point measurements of Cluster, 88 flapping events with respect to its flapping types are statistically surveyed. The statistical results show that, the steady flapping events tend to occur around the midnight region, and the kink-like flapping events tend to occur at both flanks of the magnetotail. Thus, we present that, the kink-like flapping motion is casually related with the steady flapping motion, i.e. the up and down motion of steady flapping around the midnight region induces the kink-like flapping waves which propagate towards both flanks of the magnetotail.