



## **The current sheet tiled and non-adiabatic ions effect on the flapping motion in magnetotail**

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The current sheet is a crucial region of the magnetotail, where energy reserve and release take place. The origin of the up-down motions of the current sheet, referred to as flapping motions, is among the most fundamental issues of magnetotail dynamics. Observational evidences suggest that the flapping motion is a kind of internal excited kink-like waves, but its particular propagating features such as the low phase speeds and the propagating direction from the tail center toward flanks do not match any local generation mechanisms previously established so far. Here we report observations of the current sheet flapping motions induced by non-adiabatic ions in the magnetic field configurations with a finite guiding component, whose population present periodic hemispherical asymmetries. These flapping motion current sheet cases often observed tiled. The current sheet flapping phenomenon implies that the excitation mechanism of the current sheet flapping motions is a self-circulation process between the non-adiabatic ion population and the current sheet equilibrium itself.