



Solar wind directional change triggering flapping motions of the current sheet: MMS observations

Guoqiang Wang (1), Tielong Zhang (1,2), Mingyu Wu (1), Daniel Schmid (1), Geng Wang (1), and Martin Volwerk (2)

(1) Harbin Institute of Technology, Shenzhen, China, (2) Space Research Institute, Austrian Academy of Sciences, Graz, Austria

We report on a flapping motion event near the substorm onset on 17 June 2017 using Magnetospheric Multiscale (MMS) mission data. A strong current density with a maximum value of ~ 190 nA/m² is observed during the flapping. The north-to-south (south-to-north) crossing of the neutral sheet corresponds to an increase (a decrease) of the Z_{GSM} component of the solar wind $V_{Z,SW}$. The periods (~ 8 min) of the flapping and variations of $V_{Z,SW}$ are almost equal. In addition, $dV_{Z,SW}/dt$ and dB_X/dt observed by MMS exhibit a strong negative correlation. These observations suggest that the flapping motions are triggered by the solar wind directional change via creating a motion of the current sheet in the north-south direction. The pressure difference between the northern and southern lobes caused by the solar wind is expected to be a possible contribution to the formation of the flapping.