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# The Helicity Sign of Flux Transfer Event Flux Ropes and its Relationship to the Guide Field and Hall Physics in Magnetic Reconnection at the Magnetopause

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## Résumé

Flux Transfer Events (FTEs) are transient magnetic flux ropes typically found at the Earth’s magnetopause on the dayside. While it is known that FTEs are generated by magnetic reconnection, it remains unclear how the details of magnetic reconnection controls their properties. A recent study showed that the helicity sign of the FTEs positively correlates with the east-west (By) component of the Interplanetary Magnetic Field (IMF). With data from the Cluster and Magnetospheric MultiScale missions, we performed a statistical study of 166 quasi force-free FTEs. We focus on their helicity sign and possible correlations with upstream solar wind conditions and local magnetic reconnection properties. Using both in situ data and the Maximum Magnetic Shear model, we find that FTEs whose helicity sign positively correlates with the IMF By show moderate magnetic shears while those uncorrelated to the IMF By have higher magnetic shears. We propose that for small IMF By, which corresponds to high shear and low guide field, the Hall pattern of magnetic reconnection determines the FTE core field and helicity sign. This work highlights a fundamental connection between the kinetic processes at work in magnetic reconnection and the macroscale structure of FTEs.

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