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In situ observation of Magnetic Reconnection with a Large Guide Field at the Boundary of a Flux Rope

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Abstract

It is well known that flux ropes play important roles in the momentum and energy transport in space plasmas. The evolution of FRs is a long-standing issue. In this paper, we present a large-scale flux rope, whose cross-section was about 2 Re, observed by MMS in Earth's magnetotail. The flux rope was highly tilted with its axis proximity along the X_{GSM} direction. We found an electron-scale current sheet with a large guide field at the boundary of this flux rope. The Hall magnetic and electric field, super-Alfvénic electron outflow, parallel electric field and energy dissipation were observed associated with the current sheet. All the above signatures indicate that MMS detected a reconnecting current sheet. Interestingly, ions were not coupled in this reconnection, akin to the electron-only reconnection observed in the magnetosheath turbulence. We suggest that this reconnection process was dissipating the flux rope. This result will shed new lights for understanding the multi-scale coupling associated with flux ropes in space plasmas.

References

The references related to your talks will be used to write summary paper in RMPP (Rev. Mod. Plasma Phys.). So do not miss important papers related to your talk.

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