
Direct Observation of a Highly Dynamic Reconnection Rate

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Abstract

We analyze a well-resolved electron diffusion region (EDR) observed by the Magnetospheric Multiscale (MMS) mission on 29 December 2016 at 03:58:29 UT on Earth's asymmetric dayside magnetopause. Using high-resolution plasma and field data (7.5 ms FPI moments, 0.12 ms merged FSM magnetic fields), we apply both the quadratic gradient reconstruction method (Denton et al., 2020) and a multi-spacecraft B gradient technique (Heuer et al., 2022) to quantify the local aspect ratio and evolution of the reconnection X-line. We find that the EDR structure is highly dynamic, with the aspect ratio decreasing from ~ 0.84 to ~ 0.34 over a 25 ms interval, indicating a corresponding change in the normalized reconnection rate. This variation is observed concurrently with intense electron jets, elevated

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