

Waves and wave-particle interactions in magnetopause reconnection

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The role of waves in magnetic reconnection remains an outstanding question. Waves can produce particle heating and acceleration, particle diffusion, and anomalous resistivity, all of which can impact ongoing reconnection. Therefore, it is crucial to characterize the waves associated with magnetic reconnection. We investigate the waves that develop near the electron and ion diffusion regions of asymmetric reconnection at Earth's magnetopause using the Magnetospheric Multiscale spacecraft. In particular, we show that near the stagnation point intense lower hybrid drift waves are produced, which result in cross-field particle diffusion, broadening the density gradient in ion diffusion region and magnetospheric separatrices. We also show that agyrotropic beams generated in EDRs can become unstable to high-frequency electrostatic waves. These waves are sufficiently large to thermalize the beam, potentially modifying the electron dynamics near or within EDRs. We discuss the role these waves play in ongoing magnetic reconnection.

Keywords: Magnetic reconnection, Plasma waves, Wave-particle interactions