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EDR structure for symmetric and asymmetric reconnection: MMS results

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NASA's Magnetospheric Multiscale (MMS) mission has observed a number of electron diffusion/dissipation regions (EDRs) of both symmetric and asymmetric magnetic reconnection. In this talk, we compare and contrast the features of the non-ideal energy conversion rate $\vec{J} \cdot \vec{E}'$ for these two regimes. We show that in the asymmetric EDR, $\vec{J} \cdot \vec{E}' > 0$ is typically much larger and patchier than predicted and can be distributed across a highly-structured current sheet surrounding the X-line, whereas in the symmetric EDR, $\vec{J} \cdot \vec{E}' > 0$ is typically confined to the region of strongest current very near the X-line. $\vec{J} \cdot \vec{E}' < 0$ also commonly appears in the central EDR of asymmetric reconnection, whereas in symmetric reconnection, $\vec{J} \cdot \vec{E}' < 0$ is limited to the outer EDR and separatrices.