



Localized Energy Conversion within a Reconnection Diffusion Region

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The four MMS spacecraft encountered an electron diffusion region near 13:07:02.2 UT on 16 Oct. 2015. Electron distribution functions with 30-ms cadence show non-gyrotropic distributions with predicted crescent-shaped peaks near the stagnation point on the magnetosphere side of the reconnection X-line. Breaking and reconnection of field lines is indicated by the transition of the crescent feature from perpendicular to parallel to the local magnetic field line with downward magnetosheath electrons and upward magnetospheric electrons populating open field lines. Multiple bipolar electric field pulses (possibly solitary waves) with magnitudes from 20 - 100 mV/m were observed in the L and M boundary normal coordinates by MMS2 and MMS3 along with a quasistatic positive normal electric field component. The strongest of these events, which resulted in significant $\mathbf{J} \cdot \mathbf{E}$ dissipation and quenching of widespread magnetosonic waves at 30 - 40 Hz, occurred at the precise location of field-line breaking and reconnection. Weaker $\mathbf{J} \cdot \mathbf{E}$ signatures were observed at some of the other events, suggesting the occurrence of multiple, or patchy energy conversion within the diffusion region.