



Current Structure of off-equatorial Dipolarization Fronts from Magnetospheric Multiscale (MMS) Observations

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In this study, we investigate the current structures of dipolarization fronts (DFs) that are signaled by sharp enhancements of the north magnetic B_z , using two tail season magnetic field data from Magnetospheric Multiscale (MMS) spacecraft. With MMS satellites at radial distances within 12, we study the properties of dipolarization front current system (DFCS) at the near-Earth magnetotail regions. In 2016, the apogee of MMS satellites was away from the central plasma sheet. We are able to study the field-aligned current (FAC) associated with DFs at the off-equatorial region with the curlometer method. At regions of high latitudes, we find that the parallel component of currents dominates in both the dip region and the front region, while DFCS is dominated by the perpendicular current near the equatorial plane shown by 2015 MMS magnetic field data. The in situ observations of the DF field-aligned current at high latitudes show that the R-1 sense current wedge forms in the front region while the R-2 current wedge in the dip region. It suggests that the current systems form around DFs may connect with the Earth's ionospheric current through field-aligned currents. However, the R-1 FACs in the front region are connected with the duskward equatorial current, which is different from the substorm current wedge configuration.