FTEs: Theory, Simulation, and Observations

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Flux transfer events (FTEs) are ropes of interconnected magnetosheath and magnetospheric magnetic field lines generated by bursty reconnection at the dayside magnetopause. Theory predicts that the combined pressure gradient and magnetic curvature forces should determine the speed at which the events move and the locations where they can be observed. We present results indicating that events form on the dayside magnetopause for both northward and southward IMF orientations, but that the events for northward IMF orientations exhibit far weaker signatures until they reach the magnetospheric flanks and argue that this is consistent with observations indicating that events on the dayside tend to occur for southward IMF orientations, but those on the flank do not. We show that the component and antiparallel reconnection models predict events in strikingly different quadrants outside the flanks of the magnetotail.Observations of events in all four quadrants indicate that both models are required. The motion of events inferred from multispacecraft timing during periods of northward IMF orientation is generally consistent with the component reconnection model.