

## Substorm associated large-scale magnetic field changes in the tail lobe: A necessary condition for the plasmoid formation

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Magnetic field variations in the magnetotail lobe are examined, with a special emphasis on sudden decreases in the magnetic field component parallel to the equatorial plane, BE. The BE component scaled to a fixed distance from the Earth, corrected for the compression effect of the solar wind dynamic pressure, is designated as BEnc. It is found that the BEnc value just before sudden BE decreases correlates well with the Dst index;  $B_{Enc} = 37.5 - 0.217 Dst_0$ . This regression function tends to delineate the upper limit of BEnc values, when they are sorted by the Dst index. This finding suggests the existence of the critical values in BE to form a plasmoid.

Magnetic field variations in the magnetotail lobe are examined, with a special emphasis on sudden decreases in the magnetic field component parallel to the equatorial plane, BE. Using data obtained from ISEE 1 for 1978 and 1979, sudden BE decrease events associated with magnetic field dipolarizations are sampled. The BE component scaled to a fixed distance from the Earth, corrected for the compression effect of the solar wind dynamic pressure, is designated as BEnc. It is found that the BEnc value just before sudden BE decreases correlates well with the Dst index;  $B_{Enc} = 37.5 - 0.217 Dst_0$ , where  $Dst_0$  denotes the Dst index corrected for the compression effect of the solar wind dynamic pressure. It is shown that this regression function tends to delineate the upper limit of BEnc values, when they are sorted by the  $Dst_0$  index. This finding implies the existence of an internal condition to form a plasmoid. It is suggested that a plasmoid can grow rapidly when the BEnc component reaches a critical value derived from the above equation.