Dispersionless and Weakly Dispersed Injections in the Dayside Magnetosphere with Evidence of Mirror Wave Signatures

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We present observational evidence of mirror waves in the dayside inner magnetosphere as measured with instrumentation on the dual NASA Van Allen Probes spacecraft. While mirror waves near the dayside bow shock have been reported from several spacecraft missions (e.g. Cluster, THEMIS, MMS), their presence in the dayside inner magnetosphere has not been reported. We speculate that the mirror modes are associated with direct dayside injections under negative Bz conditions, and drift to lower L-shells. The analyzed event coincides with the main phase of a CME shock-induced space weather storm, with high solar wind speeds in excess of 700 km/s and a sudden drop in Dst occurring approximately eight hours prior to the event. The highest plasma beta values were measured by spacecraft B at 12:24 at magnetic noon at L ~ 4.5-5.5. Spacecraft A later measured a similar feature at 13:00 local magnetic time. The potential presence of such mirror waves would indicate dayside sources of anisotropy inside the magnetopause, or the penetration of bow shock particles into the dayside inner L-shells. To our knowledge, this is the first time such waves have been reported in the inner magnetosphere.