Walen and Slow-mode Shock Analyses Applied to High-speed Flows of the Near-Earth Magnetotail

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Observed changes in the high-speed magnetotail flow direction from earthward to tailward and vice versa have been interpreted as a reconnection X-line passing by the spacecraft. Here we analyze three such events using Cluster observations from the near-Earth magnetotail. Initial results suggest that tailward flows are accelerated across Petschek-type slow-mode shocks based on the Rankine-Hugoniot shock jump conditions and the Walen relation. Earthward flows, however, tend to fail these tests. A possible explanation may be the obstacle posed by the higher magnetic field pressure of the inner magnetosphere. These events suggest that X-lines formed in the near-Earth region within X = -20 Re.