



Simultaneous Observations from Multiple Spacecraft of Transient Pressure Pulses in the Magnetosheath

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Transient pressure pulses in the magnetosheath carrying magnetic field enhancements have been observed with Magnetospheric Multiscale Spacecraft (MMS) and Cluster observations. Strong central current sheets and different plasma populations on either side of the current sheets distinguish these pressure pulses from other better-understood magnetosheath transient events, such as the flux transfer events (FTEs).

Different explanations have been proposed for such plasma pulses. Some suggest that they result from colliding flux ropes, while others think that they are by-product of reconnection at the magnetopause. We believe that they are similar to interplanetary field enhancements (IFE) in the solar wind. Any charged dust clouds traveling in the solar wind at the solar wind speed would not slow down at the bow shock, but would push the field lines ahead and create pressure pulses as they slow down in the sheath flow.

To evaluate these different hypotheses, we use simultaneous observations from multiple spacecraft to investigate the structures microscopically, i.e. the distribution of current density and the force balance, as well as macroscopically, i.e. the motion of the structure and the magnetic field topology.