

## Anomalous flow deflection at the low Alfvén Mach number bow shock

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The Earth's magnetosphere is an obstacle to the super-sonic solar wind and the bow shock is formed in the front-side of it. In ordinary hydro-dynamics, the flow decelerated at the shock is diverted around the obstacle symmetrically about the Earth-Sun line, which is indeed observed in the magnetosheath most of the time. Here we show a case under a very low density solar wind in which duskward flow was observed in the dawnside magnetosheath. A Rankine-Hugoniot test across the bow shock shows that the magnetic effect is crucial for this "wrong flow" to appear. A full three-dimensional Magneto-Hydro-Dynamics (MHD) simulation of the situation in this previously unexplored parameter regime is also performed. It is illustrated that in addition to the "wrong flow" feature, various peculiar characteristics appear in the global picture of the MHD flow interaction with the obstacle. The magnetic effect at the bow shock should become apparent not only under low-density solar wind but also under strong IMF associated with Coronal Mass Ejection (CME) passages.