



Comparison of Cluster and Double Star Flow Measurements near the Cusps and near the equatorial Magnetosheath with the IMech Model

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Most magnetopause models do not take into account the magnetopause cusp indentation, so that the calculated flow near the cusps results to be unrealistic. We present a model, developed at the Institute of Mechanics (Sofia), which comprises of a simplified gas-dynamic model of the magnetosheath and a magnetosphere hybrid model with a data-based magnetospheric current system and a numerical magnetopause shielding current system. The positions and the shapes of the bow shock and the magnetopause are determined self-consistently as part of the numerical procedure, based on the pressure balance. Plasma decelerations in the cusp indentation can be taken into account, along with the dependence of magnetopause shape on geomagnetic dipole tilt. The model performance is evaluated, under different solar wind conditions, by comparing the model flow parameters with Cluster observations during several magnetosheath crossings in the Northern and Southern cusp regions and with simultaneous Double Star observations made in the near equatorial magnetosheath.