



Comparison of Numerical Modelling and Cluster Observations of Magnetosheath Flow near the Cusps

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Most of the widely used data based magnetopause models do not take into account the magnetopause cusp indentation, so that the calculated flow near the cusps results to be unrealistic. This paper is based on a new model, developed at the Institute of Mechanics (Sofia), which includes, in a self-consistent modular approach, a simplified gas-dynamic model of the magnetosheath and a magnetosphere hybrid model including 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. Both magnetopause normals and plasma decelerations in the cusp indentation can be taken into account, along with the magnetopause shape dependence on the geomagnetic dipole tilt. The model performance is evaluated, under different solar wind conditions, for several cases of magnetosheath crossing in the Northern and Southern cusp regions by comparing the model flow parameters with Cluster observations.