

Determining the thickness and the sub-structure details of the magnetopause from MMS data

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The magnetopause thickness, like its mean location, is a notion that can have different meanings depending which parameters are considered magnetic field or plasma properties. In any case, all the determinations have been done, up to now, considering the magnetopause boundary as a structure strictly stationary and 1D (or with a simple curvature). These determinations have shown to be very sensitive to the accuracy of the normal direction, because it affects the projection of the quantities of interest in studying geometrical sensitive

phenomena such as the magnetic reconnection. Furthermore, the 1D stationary assumptions are likely to be rarely verified at the real magnetopause. The high-quality measurements of MMS and their high time resolution now allow investigating the magnetopause structure in its more delicate features and with an unequal spatio-temporal accuracy. We make use here of the MDD tool developed by which gives the dimensionality of the gradients from the four-point measurements of MMS and allows estimating the direction of the local normal when defined. Extending this method to various quantities, we can draw their profiles as functions of a physical abscissa length instead of time along a sensible normal. This procedure allows answering quantitatively the questions concerning the locations and the thicknesses of the different sub-structures encountered inside the "global magnetopause".

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