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The magnetopause discontinuity: a MMS study.

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The magnetopause boundary seems to escape the general classification of discontinuities since it mixes characteristics of shocks (magnetic field magnitude increase) and those typical for the rotational discontinuities (magnetic rotation), whereas it is very often described as a tangential discontinuity. As, the main issue is the amount of matter/momentum/energy from the solar wind and entering into the magnetosphere, the solution cannot be simply achieved by assuming the discontinuity as strictly tangential, everywhere and at all times. Here we propose to study the magnetopause boundary as a "quasi-tangential" discontinuity, with the normal magnetic component Bn small but not null since even small departures from the standard hypothesis of a zero Bn can lead to noticeable changes in the global properties. In that aim, we look into the MMS database for a large number of magnetopause crossings. For each case we will determine what are the most important features (non-planarity, non-stationarity, Hall effect, pressure anisotropy and agyrotropy) that allow the discontinuity to escape the general classification, i.e. to noticeably change the form of the conservation laws on which the theory of discontinuities is based for non-strictly tangential discontinuities. We put a special emphasis on the refined methods that can be used for determining the spatial gradients from four spacecraft data and on the accuracy that can be attained by these methods.