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The shape of the magnetodisk of Saturn – as revealed by in situ measurements

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The magnetodisk, this complex magnetic/plasma structure plays a very important role in the magnetospheres of the giant planets. The density and composition of the magnetospheric plasma, as well as the properties of the magnetic field show a very strong dependence on the position of the measurement site relative to the central sheet of the magnetodisk. On the other hand, these properties strongly influence the interaction of the magnetospere with the various bodies orbiting around the planet, including its moons.
It is relatively easy to find events in the magnetic and ion data, in which the spacecraft crosses the central sheet of the magnetodisk. These events are indicated by very high density plasma, dominated by the heavier ion component(s), and by several magnetic signatures as well. It would be equally important to know the shape of this central sheet not only at the crossing sites.
In this paper we present a method which can be used to reconstruct the shape of the central sheet of the nightside magnetodisk using the magnetic field and plasma data of in situ measurements. At first we retrieve the distance between the spacecraft and the central sheet, then build a central sheet, which is consistent with these distance data. Our results can be use to test the existing magnetodisk models.