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# Pressure anisotropy in Jupiter's magnetodisc

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## Abstract

The magnetosphere-ionosphere coupling current system at Jupiter has been studied by a number of authors over the last decade. Until recently, however, the various modelling studies treated the magnetic field as an empirically-based input derived from Voyager observations. This limitation was removed by Nichols (2011), who employed a self-consistent field model calculated using force-balance between the outward plasma pressure gradients plus the centrifugal force of the rotating iogenic plasma, and the inward JxB force arising from the azimuthal current sheet. However, the above study, which incorporated the magnetic field model of Caudal (1983), employed isotropic plasma pressure, whereas it is known that anisotropic plasma pressure plays a key role in the stress balance at Jupiter (e.g. Paranicas et al., 1991). In this paper we generalise the computation to include anisotropic pressure, and compute the magnetic field by summing over elliptical integrals. We then calculate the magnetosphere-ionosphere coupling currents assuming an equatorial parallel-to-perpendicular pressure ratio of 1.14, the value determined by Paranicas et al. (1991), and we also consider the effect on the system of solar wind-induced compression events. We find that the anisotropy current dominates the current sheet in the middle magnetosphere between 20-40RJ, and that Jupiter's magnetosphere is susceptible to the firehose instability.

## References

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