



Periodic asymmetries in Saturn's magnetosphere

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Despite Saturn having a near perfectly axisymmetric planetary magnetic field with a dipole tilt of much less than 0.06 degrees, oscillations with a period of ~ 10.7 hr, known as “Planetary Period Oscillations” (PPOs) are present throughout its magnetosphere. In particular, these were observed by the Cassini mission in the magnetic field, radio, and particle data. These observations revealed that there are two PPO systems and periods, one associated with the northern hemisphere, and the other with the southern. The periods of these systems slowly varied over the Cassini mission. Here we will review the results of the Cassini mission highlighting the asymmetries that are introduced by the PPO perturbation systems. We will show the form, position, and strength of field-aligned current systems which through Ampère's law give rise to the magnetic field perturbations associated with the PPOs. By comparing different sets of field-aligned current observations we will discuss inter-hemispheric, local time, and seasonal differences. In addition, we show how PPO amplitudes vary with latitude along a given flux tube, where comparison of data from the early part of the end of the mission to early 2008 shows a noon-midnight asymmetry in amplitude. This is important due to the presence of both PPO systems in the equatorial region and their combination results in large-scale periodic motions of the current sheet and further into the magnetosphere. Finally, we will discuss the long-term variation of the PPO periods which, in part, appear to be linked the changing of Saturn's season.