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Magnetic Field Statistics in Saturn's Magnetosphere

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We present a statistical study of the fluctuations of the magnetic field for different regions of Saturn's magnetosphere as measured by the magnetometer instrument (MAG) on board the Cassini spacecraft. The magnetometer data, for a set of illustrative orbits during the prime mission, are used to construct probability distribution functions (PDFs) of magnetic fluctuations, in both the field-aligned and perpendicular directions. This technique is often used to look for intermittent plasma turbulence and non-self-similar properties in the fluctuations. Here we investigate the possibility to successfully characterise a region and/or regime of the magnetosphere in the signature of these PDFs. We construct PDFs from first principles, and we also consolidate our analysis by using an on-line data analysis tool "Demonstrator for Multi-dimensional Spectral Analysis of Electromagnetic Fields" developed under the Europlanet Joint Research Activity 3. We determine polarisation and propagation properties of the observed fluctuations as a function of frequency. We also comment on the applicability of these methods to identifying different characteristic frequencies and directions of boundary waves, such as Kelvin-Helmholtz disturbances.