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Nature of magnetic fluctuations in Saturn's middle magnetosphere

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In the E-ring plasma torus the magnetic field is generally quiet, with the exception of the almost continual presence of ion cyclotron waves. However, when the field strength drops below about 100 nT near the orbit of Dione, the magnetic field becomes much noisier in the 1-10 mHz band. In this region the noise is dominantly compressional. The source of this noise has been interpreted as the interchange mode. It is clear that there are flux tubes of varying plasma beta but it is not as obvious how these flux tubes are heated. Perhaps the heating is associated with the cessation of line-tying in the ionosphere that is believed to occur in this region. Much further out, where the field strength is close to 10 nT, the plasma no longer is dominated by compressional fluctuations but becomes dominated by transverse fluctuations. This transition of wave types with radial distance varies from pass to pass, both inbound and outbound, signaling a strong temporal variation in the fluctuation level in the saturnian magnetosphere. We explore this variability in the data received to date.