Enhancement of the electron gyroharmonics amplitude close to the plasma frequency observed by the WHISPER/CLUSTER experiment

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The Wave of HIgh frequency and Sounder for Probing of Electron density by Relaxation (WHISPER) performs the measurement of the electron density on the four satellites of the CLUSTER project. The two main purposes of the WHISPER experiment are to record the natural waves and to make a diagnostic of the electron density using the sounding technique. The various working modes and the fourier transforms calculated on board provide a good frequency resolution obtained in the bandwidth 2-80 kHz and a well instrumental adaptability to determine the electron density in various plasma.

In this presentation, we will focus on the plasmaspheric region where the plasma frequency Fpe is above the electron gyrofrequency Fce. In active mode the spectrum exhibits various resonance frequencies as upper hybrid frequency Fuh, Bernstein mode Fqn, electron gyroharnomics nFce and plasma frequency. To extract the electron density, it is necessary to clearly identify and name these various resonances. This task could be difficult when several electron populations and thermal effects exist. In previous works (Trotignon et al., 1986), it has been shown that the plasma frequency is usually close to the maximum amplitude of the spectrum, which allows the frequency domain where to look for the plasma frequency resonance to be determined. In this work, we will show that the amplitude of the electron gyroharmonics depend strongly of the frequency distance (Fpe –nFce). In addition, we will present a simular study for the Bernstein's resonances.