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Parametric study of sweep rates of wave packets of whistler mode chorus

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Whistler-mode chorus consists of intense electromagnetic wave packets. These chorus wave packets are generated by a nonlinear mechanism involving interactions of waves with energetic electrons in Earth's inner magnetosphere. The chorus source region is localized close to the geomagnetic equatorial plane. We define the central position of the source region as the point where the parallel component of the total Poynting flux changes its sign. Chorus wave packets are discrete time-frequency structures in a frequency range from a few hundreds of Hz to several kHz and at time scales from a few tenths of seconds to a few seconds. Our investigation is based on multipoint measurements of the wideband (WBD) plasma wave instruments on board the four Cluster spacecraft. The WBD observations in the chorus source region allow us to analyze spectrograms with a high time resolution. We investigate the sweep rate of the emission frequency as a function of the cold plasma density in the equatorial plane. We compare our results with recent theoretical and simulation results that show that the sweep rate of chorus risers increases for lower cold plasma densities. We verify that the cold plasma density exerts a significant control over the magnitude of the sweep rate.