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Saturn chorus intensity variations due to local electron phase space density

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Whistler mode chorus plasma wave emissions have been observed at Saturn, particularly near the magnetic equator which appears to be close to the source region. However, during crossings of the magnetic equator along nearly constant L shells, the Cassini Radio and Plasma Wave Investigation (RPWS) often observes a local decrease in chorus intensity and bandwidth closest to the magnetic equator, where linear growth appears to dominate, with nonlinear structures appearing at higher latitudes and higher frequencies. In addition, chorus emissions with enhanced intensities and bandwidths are often observed within plasma injection regions. We investigate linear chorus growth rate using the WHAMP dispersion solver and locally observed electron phase space density measurements from the Electron Spectrometer (ELS) sensor of the Cassini Plasma Spectrometer Investigation (CAPS) to determine the parameters responsible for the variation in chorus intensity and bandwidth. We find that a temperature anisotropy ($T\perp/T\| \sim 1.3$) may account for linear temporal and spatial growth rate of the chorus emission, which provides a majority of the observed frequency-integrated power. At the highest chorus frequencies, intense, nonlinear, frequency-drifting structures are observed a few degrees away from the equator, but account for only a fraction of the total power. Chorus emission observed within a plasma injection region is sometimes nonlinear. For such a case we find $T\perp/T\| \sim 1.5$, and significant levels of nonlinear relative to linear power.