



Growth-rate analysis of kronian narrowband emission

J. D. Menietti (1), S.-Y. Ye (1), P. H. Yoon (2), and O. Santolik (3)

(1) University of Iowa, Department of Physics and Astronomy, Iowa City, Iowa, United States (john-menietti@uiowa.edu, 319 335 1753), (2) Institute for Physical Science and Technology, University of Maryland, College Park, MD United States, (3) Charles University, and also Institute of Atmospheric Physics, Prague, Czech Republic

Narrowband emission is observed at Saturn centered typically near 5 kHz and 20 kHz and harmonics of each frequency. This emission appears to be in many ways similar to Jovian narrowband emission observed at higher frequencies. We analyze an example of this emission near a probable source region. In-situ electron distributions suggest narrowband emission has a source region associated with electrostatic cyclotron and upper hybrid emissions. Linear growth rate calculations indicate that the observed plasma distributions are unstable to the growth of electrostatic harmonic emissions. In addition, it is found that when the local hybrid frequency is close to $2 f_{ce}$ or $3 f_{ce}$ (f_{ce} is the electron cyclotron frequency), electromagnetic Z-mode and weak ordinary (O-mode) emission can be directly generated by the cyclotron maser instability. In the presence of density gradients, Z-mode emission can mode-convert into O-mode emission, and this might explain the narrowband emission observed by the Cassini spacecraft.