

Abstract Submitted  
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**A Free-Electron-Laser Model for Chorus Wave Chirp in the Earth's Magnetosphere**<sup>1</sup> A. RUALDO SOTO-CHAVEZ, AMITAVA BHATTACHARJEE, Space Science Center, University of New Hampshire — Chorus are a form of very low frequency waves that propagate in the Earth's magnetosphere. They are responsible for the acceleration of electrons in the Van Allen radiation belts and for electron scattering leading to atmospheric precipitations. One of the persistent features of chorus waves is the chirp in their frequency. Based on an extension of our recent model of chorus as a high-gain free-electron laser (Phys. Plasmas 19, 010701 (2012)), we find an analytical expression for the chorus frequency sweep (chirp) that is in agreement with observations. The new calculation yields a full asymptotic expression for the wave magnetic field and phase. We demonstrate that by considering propagation effects, that is, relative velocity differences between electrons and the radiation field, a modification on the field phase is generated. This modification is manifested as a chirp in frequency. We show that spatial inhomogeneities of the magnetic field do not play an essential role in chirp generation.

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