



VERSIM in KYOTO 23 - 27 Mar. 2020
VLF/ELF Remote Sensing of Ionospheres & Magnetospheres



Some Results of Theoretical Study on Quasiperiodic VLF Emissions

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A formalism describing comparatively slow whistler wave spectrum evolution in the planetary electron radiation belts is developed. Some common aspects of the wave spectrum evolution near and far from the steady-state are found. A relationship between wave spectrum evolution in a separate spectral element and the energetic electrons source power and anisotropy in the magnetic flux tube is noted. Many important properties of the quasiperiodic VLF emissions, such as the location of the excitation region, frequency band, repetition periods, connection with magnetic pulsations, temporary wave spectrum evolution, accumulation and precipitation of particles are explained.



Chorus Emissions Triggered by the Shot Electromagnetic Noise

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Some theoretical aspects of magnetospheric VLF chorus excitation are discussed. An original approach to solving the problem of oblique chorus excitation is outlined and partially realized within the framework of a beam pulsed amplifier mechanism [1]. Parameters of the resonance electron beam in the chorus excitation region are determined theoretically [2]. A short electromagnetic pulse amplification is calculated. It is shown that in the duct, discrete spectral elements of chorus with a narrow angular spectrum along the external magnetic field can be excited at frequencies close to half of the electron cyclotron frequency [3]. Some important properties of the chorus emissions, such as the location of the excitation region, frequency band, wave vector direction, group velocity direction, temporary dynamics, and energy of particles and waves are explained.

References

[1] Bespalov Peter, Savina Olga. An excitation mechanism for discrete chorus elements in the magnetosphere. *Annales Geophysicae*, 2018, v. 36, issue 5, p. 1201-1206. DOI: 10.5194/angeo-36-1201-2018

[2] Bespalov P.A., Savina O.N. On the linear theory of oblique magnetospheric chorus excitation. *Journal of Atmospheric and Solar-Terrestrial Physics*, 2019, v. 185, p. 58-67. DOI: 10.1016/j.jastp.2019.01.016

[3] Bespalov P.A., Savina O.N. Excitation of chorus with small wave normal angles due to beam pulse amplifier (BPA) mechanism in density ducts. *Annales Geophysicae*, 2019, v. 37, issue 5, p. 819-824. DOI: 10.5194/angeo-37-819-2019