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# PHYSICS OF AURORAL PHENOMENA

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Abstracts

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## Significance of the electron plasma parameter value for chorus excitation in the middle magnetosphere

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The threshold condition for the excitation of VLF electromagnetic radiation with a chorus structure of the dynamic spectrum in the daytime magnetosphere through the *BPA* (Beam Pulse Amplifier) mechanism of amplifying short noise electromagnetic pulses is considered. The kappa distribution was used as a model function of the electron velocity distribution in the magnetosphere. Calculations performed for this distribution showed that the threshold for excitation of chorus basically depends on the electron plasma parameter, equal to the ratio of the gas-kinetic pressure of electrons to the magnetic pressure. This is consistent with the pattern that we discovered from observations of the Van Allen Probe spacecraft on the dependence of the probability of excitation of chorus on the irregularity of the magnetic field, which represents sharp fluctuations in the magnitude of the magnetic field near its local minima, where outside the plasmasphere the radiation under study can be excited. In the presence of irregularity, the probability of detecting chorus is more than 70%, and in the absence or very low irregularity, the probability of the absence of any radiation is about 80%. The noted results indicate a common reason for the excitation of chorus and the irregularity of the magnetic field - a small but finite value of the electronic plasma parameter.

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## Aspects of the Hectometric Continuum Radiation

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Measurements of the electrical component of the electromagnetic field in the frequency range 2 kHz – 10 MHz on the Japanese ERG satellite (Arase) made it possible to detect new radiation of the hectometric continuum type, which is a linear spectrum at frequencies 600-1700 kHz. Statistics were collected for three years (489 cases), according to which it was possible to establish that this type of radiation is observed mainly at night, doesn't depend on geomagnetic activity, and the supposed source(s) is located at low latitudes. A possible mechanism for generating a hectometric continuum is the mechanism of double plasma resonance, which consists in a sharp increase instability of plasma waves when the upper hybrid frequency coincides with the cyclotron harmonic frequency. As a result, plasma waves are excited, which are then transformed into intense electromagnetic radiation through the mechanism of three-wave interaction. The implementation of this mechanism should take place on the gradient of the magnetic field and concentration. It is assumed that the concentration gradient is caused by the so-called "ionospheric hole", which forms at low latitudes at altitudes of ~1000 – 2500 km. Also, it was found that with a decrease in frequency, the angle of propagation of the hectometric radiation also decreases.

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