**VLF chorus emissions modeling using EPOCH PIC code: analysis of the fine structure of chorus elements**

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We present the results of a further study of the generation of chorus VLF emissions in the Earth's magnetosphere with use of a previously proposed new numerical model based on the one-dimensional EPOCH PIC code. The original code was improved for correct implementation of delta-F method, and a mirror force due to the background magnetic field inhomogeneity was taken into account.

The main focus of the present study is on the fine structure of individual chorus elements, which may consist of several subpackets. This structure is seen in experimental data from satellites and confirmed by numerical simulations. We show that the subpackets appear in the very beginning of the formation of the chorus element, which occurs as the whistler mode wave propagates towards the equator and interacts with energetic electrons. As the wave further propagates and interacts with particles, the structure of the subpackets evolves. This occurs in accordance with currently accepted nonlinear mechanism of chorus generation.

For a quantitative analysis of the subpackets properties, we studied the parameter *N*tr, which quantifies the number of oscillations of the electron velocity caused by the nonlinear trapping of electrons in the wave field over a time equal to the subpacket duration. For the first time, we show that the relationship between the parameter *N*tr and the maximum wave field amplitude in a subelement is described by a power law dependence.