Comparative analysis of some results of quantitative processing of high-resolution data on chorus with different dynamic spectrum structures

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This paper presents a comparative analysis of selected results from the quantitative processing of high-resolution data accumulated during the Van Allen Probe A mission. The analysis is based on high-resolution data on the wave magnetic field of VLF chorus. Two original and complementary methods for processing the observational data were used. The first method involves calculating the Hausdorff dimension to determine the general properties of a theoretical model suitable for a quantitative description of the dynamics of a system that describes the excitation of VLF chorus with different dynamic spectrum structures. The second method involves a direct search for the roots of the characteristic equation responsible for the linear stage of chorus excitation. For the comparative analysis, 22 typical examples of chorus with different dynamic spectrum structures were selected - these are emissions with spectral elements in two frequency bands (below and above the gap near half the minimum electron cyclotron frequency), in the lower and upper frequency bands. In all cases, the dimension turned out to be fractional and small (2<dim<10), indicating complex system dynamics. The roots of the characteristic equation corresponding to the linear excitation stage of the chorus were determined. The analysis revealed a topologically stable structure in the distribution of the roots of the characteristic equation for chorus with different dynamic spectrum structures.

The work of ONS and GN was carried by the Foundation for the Development of Theoretical Physics and Mathematics "Basis" (project No. 23-1-1-67-1).