Numerical Analysis of the Ionized Atmosphere in the cases of VLF powerful disturbances. Part 2

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The work is the continuation of quantative analysis of the VLF powerful disturbances (PwDs) caused by ultrarelativistic electron precipitations (UrREPs) into the atmosphere [1-5]. The object of the analysis is the anomalous decrease of VLF signals (in the range 10-14 kHz), which was registered more than ten times [5], for the high latitude radio trace Aldra-Apatity. The main purpose of the work is the getting of an atmosphere effective electron concentration profile ${N}_{e}(z)$ corresponding to an experimental fact of deep compensation of the first ionosphere radio ray by the ground ray in the cases of PwDs.
The first result of the work is the quantative dependence of the compensation effect on a frequency, on the conductivity of trace ground and on two parameters, which define the effective electron concentration profile for a sporadic ionized layer of the middle atmosphere.
The second result of the work is an answer on a seeming contradiction between the corresponding results of the mode (the normal waves) theory and the ray theory. Indeed, in the case of a sporadic ionized layer in the middle atmosphere (an effectve height is near 30 km) for the distances more than 900 km only one mode is significant due to the anomalous attenuation of the other modes [5]. On the other hand, if the ground wave is compensated by the first ionospheric ray (the other rays are insignificant due to the same cause of attenuation) at a given distance between Aldra and Apatity (near 900 km), then one may wait that the radio field should to increase for the greater then 900 km distances. So it is possible to think that we have a contradiction, at which case one of the two theory variants is incorrect.
It is shown that the pointed contradiction is a seeming one and thatin the cases of PwDs the received radio signals, having become weekdue to the compensation effect at a given distance, become weeker andweeker due to the distance although the specific interference between the two diffraction rays exists.

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