

2nd International Conference on

ASTROPHYSICS AND PARTICLE PHYSICS

November 13-15, 2017 San Antonio, USA

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Forecasting of maximum usable frequencies of HF radio channel on the basis of oblique chirp sounding

Ionosphere radio lines are widely used in the over-the-horizon radar and HF radio communications. However, due to the instability of the ionosphere the adaptation of radio systems is required to changing parameters of the ionosphere signal propagation. These radio systems operate in the decameter range.

Aim of the Work: The aim of the study is the method development of the maximum usable frequency (MUF) forecasting on the radio lines which are not provided with diagnostics using the experimental data obtained in the network of radio paths of oblique ionosphere sounding by the continuous chirp signal. The data obtained on a network of experimental radio paths were analyzed. On each radio path the ionograms of oblique sounding by chirp signals were obtained every 15 minutes. Calculations of the maximum usable frequencies by the program module MINIFTZ were used in addition to the experimental data for forecasting. Two linear forecasting algorithms were considered with the use only of experimental data and with the use of experimental data and MUF calculations by the MINIFTZ program. Besides the possibility of temporary MUF forecasting within linear prediction model was researched where the predict function uses Burg's method to calculate autocorrelation coefficients. As a result of the conducted researches, it is established that the use jointly of experimental and model data reduces an error of spatial MUF forecasting to 1-2%. In case of temporary forecasting not more than for 30 minutes, the error of linear forecasting exceeds 4%.

Biography

Alex Kolchev received his PhD at the Kazan University in 1996. His research interests include the development of experimental methods of research processes in the ionospheric plasma. They are the new methods of diagnostics of nonstationary ionospheric plasma that have been developed. He participated in the development of equipment for the Russian network of ionosonde.

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