Radioelectronics and Communications Systems
Vol. 47, No. 2, pp. 13–19, 2004

Izvestiya VUZ. Radioelektronika
Vol. 47, No. 2, pp. 18–27, 2004
UDC 621.391.812:621.396.666

AN ALGORITHM FOR AUTOMATION OF THE MAXIMIN PROCEDURE IN MAKING RELIABLE DECISIONS AT TROPOSPHERIC PROPAGATION OF RADIO WAVES

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A new algorithm for automation of a maximin procedure is suggested. The algorithm helps make a reliable decision about the presence of a stable level of a signal, subject to fast, slow, and temporary fading, at tropospheric propagation of radio waves. The algorithm ensures a prescribed information reliability of communication systems, when transmitting low- and high-speed information flows, in terms of a preset error probability.

Today we hardly could find any universal methodical approach to automatic evaluation of the rate of simultaneous transmission of information flows with maximum and minimum speed, and with a prescribed error probability in the systems of tropospheric communication (TC) of various purposes.

The purpose of this paper is to work out a methodology for development of an algorithm for automatic estimation of transmission of information flows with maximal and minimal speeds in the TC systems. Particularly, we propose an algorithm for automation of the maximin procedure responsible for making a reliable decision about the existence of a stable level of a signal subject to fast, slow, and temporary fading (FF, SF, and TF) at tropospheric propagation of radio waves (TPRW). The algorithm has to ensure a prescribed information reliability of communication systems, when transmitting low- and high-speed information flows, in terms of a preset error probability.

Development of the algorithm for the maximin procedure automation includes analysis of decision-making concerning the values $\max\Delta V_{\text{FF,SF}}$ (the reserve of energy potential allocated for fast and slow fading of the signal at TPRW in communication systems) and $\min\Delta G_{\text{GF}}$ (the loss in antenna gain factor GF and signal temporary fading at TPRW) — in conformity with the hypothesis about their balance when acting as the prognosis operators. This analysis is based on the conception of determination of the loss in antenna GF, temporary fading of signals, and the algorithmization of the energy potential calculation in radio-engineering systems with an automatic compensator of signal's FF at TPRW (with regard for SF of the signal) [1, 2].

The problem consists in determining a posteriori information reliability of these systems, i.e., $P_{\text{F.INF}}^{\text{APOST}} = f(P_{\text{ERR}}^{\text{APR}})$ with regard for several major factors: multibeamness and intersymbol interference of the signal (Δt_{DEL}); temporary selective fading (TSF); presence of noise in the tropospheric radio channel, and signal's level, which is sensitive to the signal FF, SF, and TF distributed in accordance with different laws — Rayleigh's, Reiss', four-parametric (for FF), logarithmically normal (for SF), and normal (for TF) [2].

The algorithm developed with the aid of such analysis determines automatically the maximal and minimal rate of transmission of high- and low-speed information flows with a prescribed error probability. The algorithm permits to make reliable decisions, with automatic calculation of the reserve of energy potential to cope with FF and SF of the signal, with respect to the long-term median of the tropospheric signal, and to the loss in the antenna GF in the event of temporary

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25 May 2003