

MILLIMETER WAVES IN TELECOMMUNICATION

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At present, there is a tendency toward the application of millimeter waves (MMWs) in atmospheric radio links of various digital data communication systems [1]. The application of MMWs in atmospheric radio links is motivated by many advantages by this wavelength band as compared with the decimetric (0.3-3 GHz) band, especially by the possibility of forming narrow radio-wave beams with an angular width of several degrees and a gain of 30-40 dB for small apertures of the tranceiving antennae (0.2-0.5 m).

In the paper amplitude and phase of a millimeter-wave beam are investigated in the far-field (wave) zone. The investigations are carried out with the use of the angular spectrum of the complex amplitude of a field over a bounded transmitting of a parabolic antenna, the angular frequency characteristic of free space of an unperturbed atmosphere in the Fresnel (quasioptical) approximation and pattern radiation of the receiving antennae. Relations and estimates for the energy potentials of transceivers for atmospheric line-of-sight radio links

telecommunication systems are obtained with consideration the radiation patterns of the elementary area of a Huygens source, transmitting and receiving antennas in the wave zone, as well as in the zone of deep geometrical shadow of a half-plane. The necessary transmitter power and receiver sensitivity are determined for such atmospheric radio links.

Experimental data confirmed the theoretical dependences and the gain at 40-70 dB in shadow zone by comparison with omnidirectional pattern radiation.

References

1. Andreyev G.A. "Millimeter-Wave Beams in Ground-Based Telecommunication Systems". // Journ. of Commun. Techn. and Electron. 2001, Vol.46, No.9.