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Title: Diffraction of single-period terahertz electromagnetic waves
Author: Ezerskaya, AA ; Ivanov, DV ; Bespalov, VG ; Kozlov, SA
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Abstract: Analytical expressions are obtained for the spatial distribution of the temporal spectra of paraxial waves consisting of one complete vibration of the electromagnetic field in the regions of Fresnel and Fraunhofer diffraction and for the spatiotemporal distribution of their field in the region of Fraunhofer diffraction. It is shown that, when such waves are diffracted-for example, terahertz waves-strong changes of not only the spatial but also the temporal structure of the radiation can occur: The number of field vibrations and their period varies with distance, in general differently on the axis and at the periphery of the wave packet. It is demonstrated that a quasi-discrete structure of the temporal spectrum of the radiation is formed in the process of diffraction.