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标题: Designing and studying waveguide filters of terahertz and subterahertz frequency ranges

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摘要: A unit for filtering terahertz and subterahertz electromagnetic radiation, based on using selective frequency properties of an evanescent waveguide and quasi-optical (optic-waveguide) methods for matching to the environment, are presented. The design of the filtering unit, radiated in a frequency band of 100 GHz to several terahertz, and the measurement results of the amplitude-frequency characteristics of test filters in a range of 100-700 GHz, are given. The principle of the filter construction and design allows one to obtain a sharp and predicted transmission cutoff with an insignificant attenuation in the passband and a significant suppression of low-frequency radiation in the stop region. The experimentally measured attenuation is at a level of 6-12 dB in the filter transmission band and at a level of 30-60 dB out of the transmission band; in this case, the obtained result is determined by noises of the test setup. It is shown that the theoretical attenuation value beyond the passband may reach more than 60 dB, when the frequency is only 10% smaller than the critical one. The designed filter can be used for determining and studying spectra in the subterahertz and terahertz bands, especially in the cases, which call for a sharp spectral cutoff and exclusions of long-wave radiation components.

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