Abstracts

Quasi-Optical Surface Waveguide and Other Components for the 100- to 300-Gc Region

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Components and techniques for the generation, transmission, and detection of energy in the 100- to 300-Gc frequency region were investigated theoretically and experimentally. The design and construction of fundamental components, such as harmonic generators and detectors, were necessary since many items are not available commercially. A detailed theoretical analysis was performed for the propagation characteristics of single-conductor transmission lines, and attenuation calculations were made for several dielectric image lines. Experimental measurements were made at 105 and 140 Gc on these two types of surface waveguides. Attenuation of these lines is compared with that of dominant-mode rectangular waveguide. An analysis of phase-correcting Fresnel zone plates was carried out, and several zone plates were designed, constructed and successfully tested at frequencies of 140, 210, and 280 Gc. Zone plates were used at several frequencies to make relatively long path transmission measurements and were also used in a specially designed Michelson interferometer. The frequency stability of the source klystron and the dielectric properties of a number of plastic materials were determined by measurements made with the interferometer. A method of frequency filtering by focal isolation was demonstrated with this equipment.

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