Abstracts

Design of Dielectric Grating Antennas for Millimeter-Wave Applications

F.K. Schwering and S.-T. Peng. "Design of Dielectric Grating Antennas for Millimeter-Wave Applications." 1983 Transactions on Microwave Theory and Techniques 31.2 (Feb. 1983 [T-MTT] (Special Issue on Millimeter-Waves)): 199-209.

At theoretical procedure well suited for generating design data on dielectric grating antennas for the millimeter-wave region is presented. The procedure utilizes the effective dielectric constant (EDC) method to determine the phase constant of the leaky modes supported by the antenna structure of finite lateral width. The radiation or leakage constant of these modes is obtained from the relatively simple boundary value problem of dielectric grating antennas of infinite width. For single-beam radiation, the practicably interesting case, the phase and leakage constants completely determine the field distribution in the antenna aperture, from which the directivity gain and radiation pattern are then calculated. The dependence of the antenna characteristics on the dimensions of the radiating structure is presented and discussed for epsilon = 12, the dielectric constant of typical millimeter-wave materials, such as silicon and GaAs.

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