Abstracts

Dispersion and Field Analysis of a Microstrip Meander-Line Slow-Wave Structure (Dec. 1974 [T-MTT])

J.A. Weiss. "Dispersion and Field Analysis of a Microstrip Meander-Line Slow-Wave Structure (Dec. 1974 [T-MTT])." 1974 Transactions on Microwave Theory and Techniques 22.12 (Dec. 1974, Part II [T-MTT] (1974 Symposium Issue)): 1194-1201.

A structure which is important as an example of a spatially periodic medium for microwave propagation is analyzed theoretically, with rigorous consideration of its partial dielectric composition, symmetry properties; and field configuration relating to its use for electron-wave interaction in a crossed-field amplifier (CFA). The analysis is carried out in a quasi-TEM approximation, leading to determination of a complex potential function within the unit cell and the associated normal-mode parameters: effective dielectric constant, phase velocity, and characteristic impedance, as functions of phase per cell and mode symmetry. With imposition of meander-line boundary conditions, solutions of the characteristic equation for the dispersion law of the structure are computed, including the influence of the inhomogeneous dielectric-vacuum construction of microstrip. Agreement with the observed phase and stopband features of a representative structure is very good. Power distribution and group velocity are calculated, and an interaction impedance, representing the coupling between the RF field and an electron beam for estimation of CFA performance is also calculated. The method lends itself to detailed computations, including the effects of structural features of practical slow-wave circuits.

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