Abstracts

Study of the ridge-loaded helical-groove slow-wave structure

Wenxiang Wang, Guofen Yu and Yanyu Wei. "Study of the ridge-loaded helical-groove slow-wave structure." 1997 Transactions on Microwave Theory and Techniques 45.10 (Oct. 1997, Part I [T-MTT]): 1689-1695.

The proposition to name the helical waveguide with the inner wall removed helical groove is presented in this paper. As an all-metal slow-wave circuit, the ridge-loaded helical-groove structure is especially suited for use in millimeter TWT's due to its advantages of large size, high manufacturing precision, and good heat dissipation. However, the analysis of this slow-wave circuit was never before done. For analyzing this structure, the cylindrical coordinates are employed in the center space and the helical ones are used in the gap and groove regions. Making use of the matching conditions of the RF fields and the continuity of the voltage and current at the boundaries, the expressions for the dispersion and the coupling impedance of the ridge-loaded helical groove are obtained. The relationship of the dispersion and impedance to the ridge dimensions are also given. It is indicated from the calculation results that approximately 30% bandwidth for this structure can be achieved.

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