Abstracts

A Novel Highly Accurate Synthetic Technique for Determination of the Dispersive Characteristics in Periodic Slow Wave Circuits

H. Guo, Y. Carmel, W.R. Lou, L. Chen, J. Rodgers, D.K. Abe, A. Bromborsky, W. Destler and V.L. Granatstein. "A Novel Highly Accurate Synthetic Technique for Determination of the Dispersive Characteristics in Periodic Slow Wave Circuits." 1992 Transactions on Microwave Theory and Techniques 40.11 (Nov. 1992 [T-MTT]): 2086-2094.

A novel, highly accurate (0.1-0.5%) synthetic technique for determining the complete dispersive characteristics of electromagnetic modes in a spatially periodic structure is presented. It was successfully applied for the cases of the fundamental (TM/sub 0(1)/) as well as higher order (TM/sub 0(2)/, TM/sub 0(3)/) passband modes in a corrugated waveguide. This structure is commonly used in relativistic backward wave oscillators, traveling wave tubes, extended interaction oscillators and a variety of multiwave Cerenkov generators. An appropriately shorted periodic structure resonates at specific frequencies. To accurately and unambiguously measure these frequencies we used unique antenna radiators to excite pure modes in the circuit under test. An analytical technique to derive the complete dispersion relation using the experimentally measured resonances is presented. This technique, which is based on the intrinsic characteristics of spatially periodic structures, is applicable to slow wave structures of arbitrary geometry.

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