

Mutual Coupling Between Parallel-Plate Waveguides (Dec. 1973 [T-MTT])

Y.E. Elmoazzen and L. Shafai. "Mutual Coupling Between Parallel-Plate Waveguides (Dec. 1973 [T-MTT])." 1973 Transactions on Microwave Theory and Techniques 21.12 (Dec. 1973 [T-MTT] (1973 Symposium Issue)): 825-833.

The radiation field and mutual coupling between two identical parallel-plate waveguides having the same axis of symmetry are investigated. Jones' method of formulation is applied and a modified Wiener-Hopf equation is obtained. Expressions for the radiated field in free space, reflected field in the exciting waveguide, and transmitted field in the coupled waveguide are obtained and the reflected and transmitted fields are expressed in terms of waveguide modes. The reflection coefficient for each mode is represented by three terms, two of which are due to reflections at the open end of the exciting waveguide and are constant along the waveguide. The third term is the contribution from the field scattered by the open end of the coupled waveguide and decays along the waveguide according to the radiation condition. Similarly, the transmission coefficient of each mode is represented by three terms, two of which decay along the coupled waveguide and the third one is constant. The radiation field is also divided into three terms. One of them is due to the radiation from the open end of the exciting waveguide and the other two are the contribution of multiple interactions between the two waveguides. Computed results for the reflection and transmission coefficients and the radiation field are shown for TE/sub 0,1/ excitation and various separation distance of the waveguides. The results for the reflection and transmission coefficients are oscillating functions of period π , and approach gradually the well-known final values of a single excited waveguide.

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