Abstracts

Scattering at Circular-to-Rectangular Waveguide Junctions

J.D. Wade and R.H. MacPhie. "Scattering at Circular-to-Rectangular Waveguide Junctions." 1986 Transactions on Microwave Theory and Techniques 34.11 (Nov. 1986 [T-MTT]): 1085-1091.

A formally exact solution is given for the problem of scattering at a circular-to-rectangular waveguide junction and at a thick diaphragm, with a centered circular aperture, in a rectangular waveguide. The method uses normal TE and TM mode expansions of the waveguide fields and traditional mode matching of the transverse electric and magnetic fields at the junction boundary. Exact closed-form expressions are obtained for the electric field mode-matching coefficients which couple the TE(TM) modes in the rectangular guide to the TE(TM) and TM(TE) modes in the circular guide. Numerical results are presented for the case of TE/sub 10/ mode propagation in the larger rectangular guide with all other modes cutoff. Convergent numerical results for the equivalent shunt susceptances of such junctions are obtained when about 12 modes (eight TE and four TM) are retained in the circular waveguide or in the circular aperture of the diaphragm. The results are graphically compared with formulas and curves due to the quasi-static theory of Bethe and the variational theory given in the Waveguide Handbook.

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