Abstracts

A Rigorous Three Plane Mode-Matching Technique for Characterizing Waveguide T-Junctions, and its Application in Multiplexer Design

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A rigorous method for modeling rectangular wave-guide T-junctions is presented. The method characterizes the waveguide discontinuity three times when the side-arm of the T-junction is terminated in a short circuit with three different lengths, and hence is called the three plane mode-matching technique (TPMMT). Computed and measured data on both E-plane and H-plane T-junctions are compared, showing excellent agreement for the magnitudes and phases of the scattering matrix elements. Element values of equivalent circuit models proposed by Marcuvitz are computed and approximated by simple polynomials or rational functions, giving excellent accuracy. By using the S-parameters obtained from the TPMMT method, a network model of a waveguide manifold multiplexer is formulated. All parameters of the multiplexer, including the manifold dimensions and the filters, are optimized using this network model in terms of the multiplexer specification. The experimental results match the computed optimum results without further adjustment.

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