Abstracts

A rigorous modal analysis of H-plane waveguide T-junction loaded with a partial-height post for wide-band applications

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A rigorous modal analysis (MA) for the H-plane waveguide T-junction loaded with a partial-height conducting post is presented in this paper. The analysis is based on the classical resonator mode-matching technique for waveguide junction problems and a novel concept called extended eigenmode functions. The new concept can be used for constructing eigenmode functions of a complex resonator region as long as the modal solution for a subproblem is available. Particularly for the T-junction problem, the modal solution for the two-port in-line waveguide loaded with the post is used. The proposed MA has been extensively verified by a finite-element method software package. Excellent agreement can be observed. Numerical results obtained by the analysis reveal that by adjusting the dimension of the loading post, the usable band width of the T-junction for constructing a diplexer can be significantly expanded. Since the generalized scattering matrix is obtained, the proposed analysis can be integrated with other available waveguide key building-block models for system analysis.

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