Abstracts

TLM-based modal-extraction approach for the investigation of discontinuities in the rectangular waveguide and the NRD

B. Ghosh, N.R.S. Simons, L. Shafai, A. Ittipiboon and A. Petosa. "TLM-based modal-extraction approach for the investigation of discontinuities in the rectangular waveguide and the NRD." 2002 Transactions on Microwave Theory and Techniques 50.10 (Oct. 2002 [T-MTT]): 2294-2304.

This paper describes the development of a rigorous transmission-line matrix-based modal-extraction approach to analyze discontinuities in guided-wave structures in general, with particular attention to the nonradiative dielectric waveguide (NRD). The motivation for this paper arose from the need to ascertain the admittance of a slot in the ground plane of an NRD without relying on experimental data. These data enabled one to design an NRD-based slot array following the methodology of Malherbe (1984), Malherbe et al. (1984), and Ghosh et al.(1997). Previous work in this area relied on placing observation points sufficiently remote from the discontinuity in order to ensure the decay of scattered evanescent modes to appreciably low levels. The method discussed here obviates this requirement and allows the evaluation of generalized scattering-matrix coefficients arbitrarily close to the discontinuity, thus significantly reducing the computational overhead. Results pertaining to discontinuities in the NRD and the rectangular waveguide have been presented and shown to give good agreement with those in the literature and with measurements. The perfectly matched layer has been used as an absorbing boundary condition in our simulations. Finally, the results have been verified using the power-conservation and Poynting's theorems.

❑ Return to main document.