Abstracts

Characterization of unbounded multiport microstrip passive circuits using an explicit network-based method of moments

L. Zhu and K. Wu. "Characterization of unbounded multiport microstrip passive circuits using an explicit network-based method of moments." 1997 Transactions on Microwave Theory and Techniques 45.12 (Dec. 1997, Part I [T-MTT]): 2114-2124.

This paper is concerned with a field-theoretical characterization of unbounded multiport microstrip passive circuits using an explicit network technique. The cornerstone of this efficient modeling framework is based on a method of moments (MoM) that makes use of the explicit representation of a generalized matrix of network parameters. To physically formulate the equivalent multiport network for a multiport circuit, a delta-gap voltage source backed by a vertical electric wall is conceptually introduced to terminate each port. In this way, the multiport microstrip circuit to be modeled is externally connected at an adequate location. The image principle is applied at the port to remove the electric wall and the open environment can effectively be simulated. With the unified impressed delta-gap source model and appropriate partition of the entire multiport circuit topology, a MoM procedure is developed and applied to extract the network parameters directly from the field-theoretical formulations. All possible physical phenomena such as radiation and leakage losses are incorporated in the algorithm. Two distinctive examples presented in this paper demonstrate the effectiveness of the proposed algorithm for handling multilayered multiport passive and antenna circuits. Convergence analysis is made for the filter example compared with experimental results, showing that the proposed algorithm is very stable and accurate. Theoretical and experimental results indicate that the implicit unbounded effects may be influential on electrical performance and should be considered in such a field-theoretical modeling and design tool as proposed in this paper.

❑ Return to main document.