Abstracts

A Full-Wave Mixed Potential Mode-Matching Method for the Analysis of Planar or Quasi-Planar Transmission Lines

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A newly proposed and tested full-wave mixed potential mode-matching method is presented for the analysis of planar and/or quasi-planar transmission lines. The transmission lines under investigation consist of layered (stratified) and nonlayered dielectric substrates and metal strips of finite thickness. The y-directed hybrid TE and TM Hertzian potentials, perpendicular to the interfaces between each layered region, are employed in the layered regions. The nonlayered regions, which consist of dielectric step discontinuities that destroy the layered configuration in the horizontal plane, utilize the x-directed hybrid TE and TM Hertzian potentials parallel to the horizontal plane. As a direct result, the full-wave formulation of the transmission line problem becomes systematic and easy to handle. Extensive analyses of a particular case study show that the relative convergence criterion needs to be satisfied to obtain accurate electromagnetic field solutions. The theoretical results obtained here are in very good agreement with the published data for various transmission line structures, which are the special limiting cases of the particular case study. The applications of the new formulation to the proximity effects of microstrip and Microslab lines are also illustrated by examples.

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