Abstracts

Electrodynamic analysis of combined microstrip and coplanar/slotine structures with 3-D components based on a surface/volume integral-equation approach

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This paper deals with the electrodynamic analysis of structures embedded in multilayered media, which consist of both microstrip/stripline and coplanar/slotline components also comprising three-dimensional components like vertical interconnects, finite dielectric fillings, or coatings. The analysis is based on a surface/volume integral-equation method using a magnetic surface current description for the slot areas, electric surface currents for the planar microstrip/stripline structures, and electric or polarization volume currents for the description of vertical interconnects and finite dielectric regions. The current discretization is performed by rectangular subdomain basis functions with asymmetric segmentations and corresponding volume current functions on arbitrary nonuniform meshes. For the effective and accurate evaluation of the system matrix., we apply a general asymptotic subtraction technique combined with complete analytical solutions of all dominant asymptotic system matrix entries. Furthermore, we use adaptive database techniques employed in the remaining numerical integrations and identify search algorithms for an optimized redundancy reduction. The method was applied to a large class of different structures comprising customary microstrip components, coplanar bandstop filters, and metal-insulation-metal capacitances and a new class of submillimeter-wave receivers. The results are in good agreement with experimental data or with results of finite-difference approaches, where, however, the latter require much more computational and storage effort.

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