Abstracts

Finite-difference approach to the solution of time-domain integral equations for layered structures

A numerical algorithm for the analysis of transient electromagnetic fields in planar structures is proposed based on the time-domain magnetic-field integral equation (MFIE), electric-field integral equation (EFIE), and the marching-on-in-time approach. The field vectors are represented in terms of vector potential functions which are calculated either by integration or by the three-dimensional (3-D) wave equation according to the geometry of the structure. Thus, the algorithm combines the advantages of integral equation techniques and finite-difference schemes. While this approach is applicable to any geometries, it is especially suitable for multilayered planar structures and is competitive to the finite-difference time-domain (FDTD) method in the case of open and radiating problems. Theoretical results are verified by the analysis of a pulse propagation in a homogeneous open-end microstrip line.

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