Abstracts

A new technique for the stable incorporation of static field solutions in the FDTD method for the analysis of thin wires and narrow strips

The behavior of the fields around many common objects (e.g., wires, slots, and strips) converges to known static solutions. Incorporation of this a priori knowledge of the fields into the finite-difference time-domain (FDTD) algorithm provides one method for obtaining a more efficient characterization of these structures. Various methods of achieving this have been attempted; however, most have resulted in unstable algorithms. Recent investigations into the stability of FDTD have yielded criteria for stability, and this contribution for the first time links these criteria to a general finite-element formulation of the method. It is shown that the finite-element formulation provides a means by which FDTD may be generalized to include whatever a priori knowledge of the field is available, without compromising stability. Example results are presented for extremely narrow microstrip lines and wires.

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