Abstracts

A High Accuracy FDTD Algorithm to Solve Microwave Propagation and Scattering Problems on a Coarse Grid

J.B. Cole. "A High Accuracy FDTD Algorithm to Solve Microwave Propagation and Scattering Problems on a Coarse Grid." 1995 Transactions on Microwave Theory and Techniques 43.9 (Sep. 1995, Part I [T-MTT]): 2053-2058.

If the spatial variation of electric permittivity and magnetic permeability is "small" Maxwell's equations can be approximated by the scalar wave equation in each field component. We introduce a new high-accuracy second order finite-difference time-domain (FDTD) algorithm to solve the scalar wave equation on a coarse grid with a solution error less than 10/sup--4/ that of the conventional one. The computational load at each grid point is greater, but it is more than offset by a large reduction in the number of grid points needed, as well as by a reduction in the number of iterations. Also boundaries can be more accurately characterized at the subgrid level. Although optimum performance is achieved at a fixed frequency, the accuracy is still much higher than that of a conventional FDTD algorithm over "moderate" bandwidths.

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