Abstracts

A three-dimensional fourth-order finite-difference time-domain scheme using a symplectic integrator propagator

T. Hirono, Wayne Lui, S. Seki and Y. Yoshikuni. "A three-dimensional fourth-order finite-difference time-domain scheme using a symplectic integrator propagator." 2001 Transactions on Microwave Theory and Techniques 49.9 (Sep. 2001 [T-MTT] (Mini-Special Issue on the 2001 IEEE Radio Frequency Integrated Circuit (RFIC) Symposium)): 1640-1648.

A new explicit fourth-order finite-difference time-domain (FDTD) scheme for three-dimensional electromagnetic field simulation is proposed in this paper. A symplectic integrator propagator, which is also known as a decomposition of the exponential operator or a general propagation technique, is directly applied to Maxwell's equations in the scheme. The scheme is nondissipative and saves memory. The Courant stability limit of the scheme is 30% larger than that of the standard FDTD method. The perfectly matched layer absorbing boundary condition is applicable to the scheme. A specific eigenmode of a waveguide is successfully excited in the scheme. Stable and accurate performance is demonstrated by numerical examples.

❑ Return to main document.