Abstracts

3-D ADI-FDTD method-unconditionally stable time-domain algorithm for solving full vector Maxwell's equations

We previously introduced the alternating direction implicit finite-difference time domain (ADI-FDTD) method for a two-dimensional TE wave. We analytically and numerically verified that the algorithm of the method is unconditionally stable and free from the Courant-Friedrich-Levy condition restraint. In this paper, we extend this approach to a full three-dimensional (3-D) wave. Numerical formulations of the 3-D ADI-FDTD method are presented and simulation results are compared to those using the conventional 3-D finite-difference time-domain (FDTD) method. We numerically verify that the 3-D ADI-FDTD method is also unconditionally stable and it is more efficient than the conventional 3-D FDTD method in terms of the central processing unit time if the size of the local minimum cell in the computational domain is much smaller than the other cells and the wavelength.

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