Abstracts

Numerical dispersion analysis of the unconditionally stable 3-D ADI-FDTD method

F. Zheng and Z. Chen. "Numerical dispersion analysis of the unconditionally stable 3-D ADI-FDTD method." 2001 Transactions on Microwave Theory and Techniques 49.5 (May 2001 [T-MTT]): 1006-1009.

This paper presents a comprehensive analysis of numerical dispersion of the recently developed unconditionally stable three-dimensional finite-difference time-domain (FDTD) method where the alternating-direction-implicit technique is applied. The dispersion relation is derived analytically and the effects of spatial and temporal steps on the numerical dispersion are investigated. It is found that the unconditionally stable FDTD scheme has advantages over the conventional FDTD of the Yee's scheme in modeling structures of fine geometry where a graded mesh is required. The unconditionally stable FDTD allows the use of a large time step in a region of fine meshes while maintaining numerical dispersion errors smaller than those associated with the region of coarse meshes.

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