Abstracts

A high-resolution interpolation at arbitrary interfaces for the FDTD method

J. Nadobny, D. Sullivan, P. Wust, M. Seebass, P. Deuflhard and R. Felix. "A high-resolution interpolation at arbitrary interfaces for the FDTD method." 1998 Transactions on Microwave Theory and Techniques 46.11 (Nov. 1998, Part I [T-MTT]): 1759-1766.

In recent years, the finite-difference time-domain (FDTD) method has found numerous applications in the field of computational electromagnetics. One of the strengths of the method is the fact that no elaborate grid generation specifying the content of the problem is necessary-the medium is specified by assigning parameters to the regularly spaced cubes. However, this can be a weakness, especially when the interfaces between neighboring media are curved or "sloped" and do not exactly fit the cubic lattice. Since the E- and H-fields are only calculated at the regular intervals, sharp field discontinuities at the interfaces are often missed. Furthermore, the averaging of the material properties often leads to significant errors. In this paper, a post-processing method is presented, which approximates the correct field behavior at the interfaces by interpolating between the FDTD calculated values, splitting them into the components normal and tangential to the interfaces, and then enforcing the interface conditions for each of these components separately.

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