Abstracts

Comparison of the FFT Conjugate Gradient Method and the Finite-Difference Time-Domain Method for the 2-D Absorption Problem

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The need for high-resolution distributive dosimetry demands a numerical method capable of handling finely discretized, arbtrarily inhomogeneous models of biological bodies. At present, two of the most promising methods in terms of numerical efficiency are the fast-Fourier-transform conjugate gradient method (FFT-CGM) and the finite-difference time-domain (FD-TD) method. In this paper, these two methods are compared with respect to their ability to solve the 2-D lossy dielectric cylinder problem for both the TM and TE incident polarizations. Substantial errors are found in the FFT-CGM solutions for the TE case. The source of these errors is explained and a modified method is developed which, although inefficient, alleviates the problem and illuminates the difficulties encountered in applying the pulse-basis method of moments to biological problems. In contrast, the FD-TD method is found to yield excellent solutions for both polarizations. This, coupled with the numerical efficiency of the FD-TD method, suggests that it is superior to the FFT-CGM for biological problems.

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