Abstracts

Comparison of Three Integral Formulations for the 2-D TE Scattering Problem

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Electromagnetic modeling for biomedical applications requires effective numerical methods. At present, one of the most efficient methods used to solve diffraction problems with dissipative dielectric objects is the FFT-CGM (fast-Fourier-transform conjugate gradient method). However, in contrast to TM polarization, substantial errors are found when we use it for computing the internal field distribution in the TE polarization case for 2-D objects. We here analyze the source of these errors and show that the modified method, empirically introduced in [4], is not required if correct terms in the integral equation are accounted for. With this aim in mind, we propose another integral formulation using generalized functions and compare it to several formulations available in the literature. Numerical comparisons are carried out for inhomogeneous dissipative cylinders whose electromagnetic parameters are close to those of biological tissues. The solution associated with this integral formulation appears to behave better than the others, in comparison with the exact analytical solutions.

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