Abstracts

A Numerical Solution to Full-Vector Electromagnetic Scattering by Three-Dimensional Nonlinear Bounded Dielectrics

S. Caorsi, A. Massa and M. Pastorino. "A Numerical Solution to Full-Vector Electromagnetic Scattering by Three-Dimensional Nonlinear Bounded Dielectrics." 1995 Transactions on Microwave Theory and Techniques 43.2 (Feb. 1995 [T-MTT]): 428-436.

This paper deals with electromagnetic scattering by nonlinear dielectric objects. In particular, a numerical approach is developed that is aimed at determining the distributions of the electromagnetic field vector inside a three-dimensional nonlinear, inhomogeneous, isotropic scatterer illuminated by a time-periodic incident electric field vector. An integral-equation formulation for the full-vector scattering problem is considered, and the nonlinear effect is taken into account by introducing equivalent sources and a Fourier-series representation. A system of integral equations (for each harmonic vector components and for the static term) is obtained that includes the internal electric field distribution as the unknown. After discretization, the solution is reduced to solving an algebraic system of nonlinear equations. Some preliminary numerical results are reported concerning scatterers that exhibit a specific (quadratic) dependence of the dielectric permittivity on the total electric field. The harmonic components of the scattered electric field outside the objects are also computed.

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