Abstracts

A fast reduced-order model for the full-wave FEM analysis of lossy inhomogeneous anisotropic waveguides

F. Bertazzi, O.A. Peverini, M. Goano, G. Ghione, R. Orta and R. Tascone. "A fast reduced-order model for the full-wave FEM analysis of lossy inhomogeneous anisotropic waveguides." 2002 Transactions on Microwave Theory and Techniques 50.9 (Sep. 2002 [T-MTT]): 2108-2114.

The evaluation of the frequency response of waveguiding structures by means of the full-wave finite-element method requires solving a large generalized eigenvalue problem for each frequency. This paper describes a novel approach, based on the singular-value decomposition, which drastically reduces the order of the eigenvalue problem. By inspection of the singular values, the accuracy level of the procedure may be controlled. The technique is applied to the analysis of open and closed waveguides with arbitrary cross section, lossy conductors, and anisotropic dielectric layers, by means of vector elements of generic order; higher order elements are shown to allow the accurate evaluation of fields inside lossy conductors with fewer unknowns, besides exactly modeling normal field discontinuities at material interfaces. Examples of application of the reduced-order technique are shown concerning both non-TEM and quasi-TEM structures.

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