Abstracts

Two-dimensional singular vector elements for finite-element analysis

Z. Pantic-Tanner, J. Scott Savage, D.R. Tanner and A.F. Peterson. "Two-dimensional singular vector elements for finite-element analysis." 1998 Transactions on Microwave Theory and Techniques 46.2 (Feb. 1998 [T-MTT]): 178-184.

The finite-element method (FEM) exhibits a reduced convergence rate when used for the analysis of geometries containing sharp edges where the electromagnetic field is singular. The convergence of the method can be-improved by introducing singular elements that model analytically predicted singular behavior. A number of authors have developed singular elements that are compatible with the scalar FEM. In this paper, we propose a new singular element that is compatible with edge-based vector finite elements and can cope with any order of singularity while preserving the sparsity of the FEM equations. Edge-based singular elements more correctly model singular fields and thus require fewer unknowns, while avoiding the introduction of spurious modes in the numerical solution. Numerical results verify that the convergence of the FEM is significantly improved.

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