Abstracts

A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements

R. Dyczij-Edlinger and O. Biro. "A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 15-23.

An advanced A-V method employing edge-based finite elements for the vector potential A and nodal shape functions for the scalar potential V is proposed. Both gauged and ungauged formulations are considered. The novel scheme is particularly well suited for efficient iterative solvers such as the preconditioned conjugate gradient method, since it leads to significantly faster numerical convergence rates than pure edge element schemes. In contrast to nodal finite element implementations, spurious solutions do not occur and the inherent singularities of the electromagnetic fields in the vicinity of perfectly conducting edges and corners are handled correctly. Several numerical examples are presented to verify the suggested approach.

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