Abstracts

An A Posteriori Error Reduction Scheme for the Three-Dimensional Finite Element Solution of Maxwell's Equations

U. Pekel and R. Lee. "An A Posteriori Error Reduction Scheme for the Three-Dimensional Finite Element Solution of Maxwell's Equations." 1995 Transactions on Microwave Theory and Techniques 43.2 (Feb. 1995 [T-MTT]): 421-427.

The accuracy of the finite element method (FEM) depends on the properties of the mesh which covers the problem geometry. The accuracy can usually be improved by increasing the element density in the mesh or the order of the shape functions in the elements at the expense of a significant increase in computation time. Instead, in this paper an a posterior error reduction scheme is applied to improve the accuracy in the solution of three-dimensional electromagnetic boundary value problems. In this scheme, first the FEM solution is generated by the use of lower-order shape functions. Then the numerical error is expressed in terms of higher-order shape functions and calculated on an element-by-element basis from information derived from the FEM solution. Finally, this error is added to the FEM solution to improve its accuracy. The degree of error reduction which is achieved with the application of this scheme is demonstrated by means of several simple electromagnetic boundary value problems.

❑ Return to main document.