Abstracts

Computation of Electromagnetic Fields

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This paper reviews some of the more useful, current and newly developing methods for the solution of electromagnetic fields. It begins with an introduction to numerical methods in general, including specific references to the mathematical tools required for field analysis, e.g., solution of systems of simultaneous linear equations by direct and iterative means, the matrix eigenvalue problem, finite difference differentiation and integration, error estimates, and common types of boundary conditions. This is followed by a description of finite difference solution of boundary and initial value problems. The paper reviews the mathematical principles behind variational methods, from the Hilbert space point of view, for both eigenvalue and deterministic problems. The significance of natural boundary conditions is pointed out. The Rayleigh-Ritz approach for determining the minimizing sequence is explained, followed by a brief description of the finite element method. The paper concludes with an introduction to the techniques and importance of hybrid computation.

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