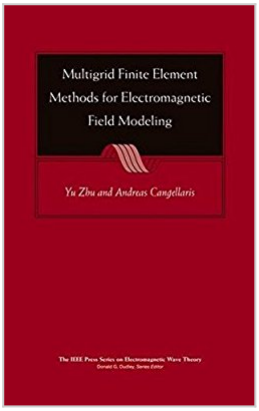

Multigrid Finite Element Methods for Electromagnetic Field Modeling

From Wiley-IEEE Press

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This is the first comprehensive monograph that features state-of-the-art multigrid methods for enhancing the modeling versatility, numerical robustness, and computational efficiency of one of the most popular classes of numerical electromagnetic field modeling methods: the method of finite elements. The focus of the publication is the development of robust preconditioners for the iterative solution of electromagnetic field boundary value problems (BVPs) discretized by means of finite methods.

Specifically, the authors set forth their own successful attempts to utilize concepts from multigrid and multilevel methods for the effective preconditioning of matrices resulting from the approximation of electromagnetic BVPs using finite methods. Following the authors' careful explanations and step-by-step instruction, readers can duplicate the authors' results and take advantage of today's state-of-the-art multigrid/multilevel preconditioners for finite element-based iterative electromagnetic field solvers.

Among the highlights of coverage are:
* Application of multigrid, multilevel, and hybrid multigrid/multilevel preconditioners to electromagnetic scattering and radiation problems
* Broadband, robust numerical modeling of passive microwave components and circuits
* Robust, finite element-based modal analysis of electromagnetic waveguides and cavities
* Application of Krylov subspace-based methodologies for reduced-order macromodeling of electromagnetic devices and systems
* Finite element modeling of electromagnetic waves in periodic structures

The authors provide more than thirty detailed algorithms alongside pseudo-codes to assist readers with practical computer implementation. In addition, each chapter includes an applications section with helpful numerical examples that validate the authors' methodologies and demonstrate their computational efficiency and robustness.

This groundbreaking book, with its coverage of an exciting new enabling computer-aided design technology, is an essential reference for computer programmers, designers, and engineers, as well as graduate students in engineering and applied physics.

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Editorial Review

From the Back Cover

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Dr.Yu Zhu has been a member of the consulting staff in Custom IC at Cadence Design Systems, Inc. since 2002. He earned his B.S. in Electrical Engineering at Nanjing University in 1995, his M.S. at Ohio State University in 1998, and his Ph.D. at University of Illinois @ Urbana-Champaign in 2002. He is a member of the IEEE and SigmaXi.

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papers and three book chapters on topics related to computational electromagnetics and interconnects and package modeling and simulation. He was elected a Fellow of the IEEE in January 2000.

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Gary Stark:

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