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Nota di contenuto	Cover; Title Page; Copyright; Contents; Preface; List of Abbreviations; Chapter 1 Basics; 1.1 Introduction; 1.2 Simulation Environments Based on MLFMA; 1.3 From Maxwell's Equations to Integro-Differential Operators; 1.4 Surface Integral Equations; 1.5 Boundary Conditions; 1.6 Surface Formulations; 1.7 Method of Moments and Discretization; 1.7.1 Linear Functions; 1.8 Integrals on Triangular Domains; 1.8.1 Analytical Integrals; 1.8.2 Gaussian Quadratures; 1.8.3 Adaptive Integration; 1.9 Electromagnetic Excitation; 1.9.1 Plane-Wave Excitation; 1.9.2 Hertzian Dipole 1.9.3 Complex-Source-Point Excitation 1.9.4 Delta-Gap Excitation; 1.9.5 Current-Source Excitation; 1.10 Multilevel Fast Multipole Algorithm; 1.11 Low-Frequency Breakdown of MLFMA; 1.12 Iterative Algorithms; 1.12.1 Symmetric Lanczos Process; 1.12.2 Nonsymmetric Lanczos Process; 1.12.3 Arnoldi Process; 1.12.4 Golub-Kahan Process; 1.13 Preconditioning; 1.14 Parallelization of MLFMA; Chapter 2 Solutions of Electromagnetics Problems with Surface Integral Equations; 2.1 Homogeneous Dielectric Objects; 2.1.1 Surface Integral Equations; 2.1.2 Surface Formulations

2.1.3 Discretizations of Surface Formulations; 2.1.4 Direct Calculations of Interactions; 2.1.5 General Properties of Surface Formulations; 2.1.6 Decoupling for Perfectly Conducting Surfaces; 2.1.7 Accuracy with Respect to Contrast; 2.2 Low-Contrast Breakdown and Its Solution; 2.2.1 A Combined Tangential Formulation; 2.2.2 Nonradiating Currents; 2.2.3 Conventional Formulations in the Limit Case; 2.2.4 Low-Contrast Breakdown; 2.2.5 Stabilization by Extraction; 2.2.6 Double-Stabilized Combined Tangential Formulation; 2.2.7 Numerical Results for Low Contrasts; 2.2.8 Breakdown for Extremely Low Contrasts; 2.2.9 Field-Based-Stabilized Formulations; 2.2.10 Numerical Results for Extremely Low Contrasts; 2.3 Perfectly Conducting Objects; 2.3.1 Comments on the Integral Equations; 2.3.2 Internal-Resonance Problem; 2.3.3 Formulations of Open Surfaces; 2.3.4 Low-Frequency Breakdown; 2.3.5 Accuracy with the RWG Functions; 2.3.6 Compatibility of the Integral Equations; 2.3.7 Convergence to Minimum Achievable Error; 2.3.8 Alternative Implementations of MFIE; 2.3.9 Curl-Conforming Basis Functions for MFIE; 2.3.10 LN-LT Type Basis Functions for MFIE and CFIE; 2.3.11 Excessive Discretization Error of the Identity Operator; 2.4 Composite Objects with Multiple Dielectric and Metallic Regions; 2.4.1 Special Case: Homogeneous Dielectric Object; 2.4.2 Special Case: Coated Dielectric Object; 2.4.3 Special Case: Coated Metallic Object; 2.5 Concluding Remarks; Chapter 3 Iterative Solutions of Electromagnetics Problems with MLFMA; 3.1 Factorization and Diagonalization of the Green's Function; 3.1.1 Addition Theorem; 3.1.2 Factorization of the Translation Functions; 3.1.3 Expansions; 3.1.4 Diagonalization; 3.2 Multilevel Fast Multipole Algorithm; 3.2.1 Recursive Clustering

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Sommario/riassunto

The Multilevel Fast Multipole Algorithm (MLFMA) for Solving Large-Scale Computational Electromagnetic Problems provides a detailed and instructional overview of implementing MLFMA. The book: Presents a comprehensive treatment of the MLFMA algorithm, including basic linear algebra concepts, recent developments on the parallel computation, and a number of application examples; Covers solutions of electromagnetic problems involving dielectric objects and perfectly-conducting objects; Discusses applications including scattering from airborne

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