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Nota di contenuto	Introduction to Numerical Electrostatics Using MATLAB®; Copyright; Contents; Preface; Introduction; Acknowledgments; 1 A Review of Basic Electrostatics; 1.1 Charge, Force, and the Electric Field; 1.2 Electric Flux Density and Gauss's Law; 1.3 Conductors; 1.4 Potential, Gradient, and Capacitance; 1.5 Energy in the Electric Field; 1.6 Poisson's and Laplace's Equations; 1.7 Dielectric Interfaces; 1.8 Electric Dipoles; 1.9 The Case for Approximate Numerical Analysis; Problems; 2 The Uses of Electrostatics; 2.1 Basic Circuit Theory; 2.2 Radio Frequency Transmission Lines 2.3 Vacuum Tubes and Cathode Ray Tubes 2.4 Field Emission and the Scanning Electron Microscope; 2.5 Electrostatic Force Devices; 2.6 Gas Discharges and Lighting Devices; 3 Introduction to the Method of Moments Technique for Electrostatics; 3.1 Fundamental Equations; 3.2 A Working Equation Set; 3.3 The Single-Point Approximation for Off-Diagonal Terms; 3.4 Exact Solutions for the Diagonal Term and In-Plane Terms; 3.5 Approximating Li,j; Problems; 4 Examples using the Method of Moments; 4.1 A First Modeling Program; 4.2 Input Data File

Preparation for the First Modeling Program

4.3 Processing the Input Data 4.4 Generating the Li,j Array; 4.5 Solving the System and Examining Some Results; 4.6 Limits of Resolution; 4.7 Voltages and Fields; 4.8 Varying the Geometry; Problems; 5 Symmetries, Images and Dielectrics; 5.1 Symmetries; 5.2 Images; 5.3 Multiple Images and the Symmetric Stripline; 5.4 Dielectric Interfaces; 5.5 Two-Dimensional Cross Sections of UniformThree-Dimensional Structures; 5.6 Charge Profiles and Current Bunching; 5.7 Cylinder between Two Planes; Problems; 6 Triangles; 6.1 Introduction to Triangular Cells; 6.2 Right Triangles
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8.5 Voltages and Fields 8.6 Stored Energy and Capacitance; Problems; 9 Refining the Finite Difference Method; 9.1 Refined Grids; 9.2 Arbitrary Conductor Shapes; 9.3 Mixed Dielectric Regions and a New Derivation of the Finite Difference Equation; 9.4 Example: Structure with a Dielectric Interface; 9.5 Axisymmetric Cylindrical Coordinates; 9.6 Symmetry Boundary Condition; 9.7 Duality, and Upper and Lower Bounds to Solutions for Transmission Lines; 9.8 Extrapolation; 9.9 Three-Dimensional Grids; Problems; 10 Multielectrode Systems; 10.1 Multielectrode Structures; 10.2 Utilizing Superposition
10.3 Utilizing Symmetry

Sommario/riassunto

"The first of its kind uniquely devoted to the field of computational electrostatics, this book dives headfirst into the actual problems that engineers are expected to solve using method of moment (MoM), finite difference, and finite element techniques. Readers are guided step by step through specific problems and challenges, covering all aspects of electrostatics with an emphasis on numerical procedures. Focusing on practical examples, mathematical equations, and common issues with algorithms, this is an ideal text for students in engineering, physics, and electrostatics--and working engineers and physicists"--
"Introduction to Numerical Electrostatics contains problem sets, an accompanying web site with simulations, and a complete list of computer codes"--