

1. Record Nr.	UNINA9910877278403321
Autore	Huray Paul G. <1941->
Titolo	Maxwell's equations / / Paul G. Huray
Pubbl/distr/stampa	Hoboken, N.J., : Wiley, : IEEE Press, c2010
ISBN	0-470-54990-4 9786613331908 1-283-33190-X
Descrizione fisica	1 online resource (310 p.)
Disciplina	530.14/1
Soggetti	Maxwell equations
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Acknowledgments -- Introduction -- 1 Foundations of Maxwell's Equations -- 1.1 Historical Overview -- 1.2 Role of Electromagnetic Field Theory -- 1.3 Electromagnetic Field Quantities -- 1.4 Units and Universal Constants -- 1.5 Precision of Measured Quantities -- 1.6 Introduction to Complex Variables -- 1.7 Phasor Notation -- 1.8 Quaternions -- 1.9 Original Form of Maxell's Equations -- 2 Vector Analysis -- Introduction -- 2.1 Addition and Subtraction -- 2.2 Multiplication -- 2.3 Triple Products -- 2.4 Coordinate Systems -- 2.5 Coordinate Transformations -- 2.6 Vector Differentiation -- 2.7 Divergence Theorem -- 2.8 Stokes's Theorem -- 2.9 Laplacian of a Vector Field -- 3 Static Electric Fields -- Introduction -- 3.1 Properties of Electrostatic Fields -- 3.2 Gauss's Law -- 3.3 Conservation Law -- 3.4 Electric Potential -- 3.5 Electric Field for a System of Charges -- 3.6 Electric Potential for a System of Charges -- 3.7 Electric Field for a Continuous Distribution -- 3.8 Conductor in a Static Electric Field -- 3.9 Capacitance -- 3.10 Dielectrics -- 3.11 Electric Flux Density -- 3.12 Dielectric Boundary Conditions -- 3.13 Electrostatic Energy -- 3.14 Electrostatic Field in a Dielectric -- Endnotes -- 4 Solution of Electrostatic Problems -- Introduction -- 4.1 Poisson's and Laplace's Equations -- 4.2 Solutions to Poisson's and Laplace's Equations -- 4.3 Green's Functions -- 4.4 Uniqueness of the Electrostatic Solution -- 4.5 Method of Images -- 5 Steady Electric Currents -- 5.1 Current Density

and Ohm's Law -- 5.2 Relation to Circuit Parameters -- 5.3  
Superconductivity -- 5.4 Free Electron Gas Theory -- 5.5 Band Theory  
-- 5.6 Equation of Continuity -- 5.7 Microscopic View of Ohm's Law --  
5.8 Power Dissipation and Joule's Law -- 5.9 Boundary Condition for  
Current Density -- 5.10 Resistance/Capacitance Calculations --  
Endnotes -- 6 Static Magnetic Fields -- Introduction -- 6.1 Magnetic  
Force -- 6.2 Magnetostatics in Free Space -- 6.3 Magnetic Vector  
Potential -- 6.4 The Biot-Savart Law.  
6.5 Historical Conclusions -- 6.6 Atomic Magnetism -- 6.7  
Magnetization -- 6.8 Equivalent Surface Current Density -- 6.9  
Equivalent Magnetic Monopole Charge Density -- 6.10 Magnetic Field  
Intensity and Permeability -- 6.11 Ferromagnetism -- 6.12 Boundary  
Conditions for Magnetic Fields -- 6.13 Inductance and Inductors --  
6.14 Torque and Energy -- Endnotes -- 7 Time-Varying Fields -- 7.1  
Faraday's Law of Induction -- 7.2 E&M Equations before Maxwell -- 7.3  
Maxwell's Displacement Current -- 7.4 Integral Form of Maxwell's  
Equations -- 7.5 Magnetic Vector Potential -- 7.6 Solution of the Time-  
Dependent Inhomogeneous Potential Wave Equations -- 7.7 Electric  
and Magnetic Field Equations for Source-Free Problems -- 7.8  
Solutions for the Homogeneous Wave Equation -- 7.9 Particular  
Solution for the Inhomogeneous Wave Equation -- 7.10 Time Harmonic  
Fields -- 7.11 Electromagnetic Spectrum -- 7.12 Electromagnetic  
Boundary Conditions -- 7.13 Particular Solution for the Wave Equation  
with Inhomogeneous Boundary Conditions -- 7.14 Memristors -- 7.15  
Electric Vector Potential -- APPENDIX A: MEASUREMENT ERRORS --  
APPENDIX B: GRAPHICS AND CONFORMAL MAPPING -- APPENDIX C:  
VECTORS, MATRICES, ORTHOGONAL FUNCTIONS -- BIBLIOGRAPHY --  
Index.

---

Sommario/riassunto

An authoritative view of Maxwell's Equations that takes theory to practice Maxwell's Equations is a practical guide to one of the most remarkable sets of equations ever devised. Professor Paul Huray presents techniques that show the reader how to obtain analytic solutions for Maxwell's equations for ideal materials and boundary conditions. These solutions are then used as a benchmark for solving real-world problems. Coverage includes: An historical overview of electromagnetic concepts before Maxwell and how we define fundamental units and universal constants today A review of vector analysis a

---