

1. Record Nr.	UNINA9910795827203321
Autore	Balanis Constantine A
Titolo	Antenna Theory : Analysis and Design
Pubbl/distr/stampa	Hoboken : , : John Wiley & Sons, Incorporated, , 2016 ©2016
ISBN	9781119178989 9781118642061
Edizione	[4th ed.]
Descrizione fisica	1 online resource (1095 pages)
Disciplina	621.382/4
Soggetti	Antennas (Electronics) Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Preface -- About the Companion Website -- Chapter 1 Antennas -- 1.1 Introduction -- 1.2 Types of Antennas -- 1.2.1 Wire Antennas -- 1.2.2 Aperture Antennas -- 1.2.3 Microstrip Antennas -- 1.2.4 Array Antennas -- 1.2.5 Reflector Antennas -- 1.2.6 Lens Antennas -- 1.3 Radiation Mechanism -- 1.3.1 Single Wire -- 1.3.2 Two-Wires -- 1.3.3 Dipole -- 1.3.4 Computer Animation-Visualization of Radiation Problems -- 1.4 Current Distribution on a Thin Wire Antenna -- 1.5 Historical Advancement -- 1.5.1 Antenna Elements -- 1.5.2 Methods of Analysis -- 1.5.3 Some Future Challenges -- 1.6 Multimedia -- References -- Chapter 2 Fundamental Parameters and Figures-of-Merit of Antennas -- 2.1 Introduction -- 2.2 Radiation Pattern -- 2.2.1 Radiation Pattern Lobes -- 2.2.2 Isotropic, Directional, and Omnidirectional Patterns -- 2.2.3 Principal Patterns -- 2.2.4 Field Regions -- 2.2.5 Radian and Steradian -- 2.3 Radiation Power Density -- 2.4 Radiation Intensity -- 2.5 Beamwidth -- 2.6 Directivity -- 2.6.1 Directional Patterns -- 2.6.2 Omnidirectional Patterns -- 2.7 Numerical Techniques -- 2.8 Antenna Efficiency -- 2.9 Gain, Realized Gain -- 2.10 Beam Efficiency -- 2.11 Bandwidth -- 2.12 Polarization -- 2.12.1 Linear, Circular, and Elliptical Polarizations -- 2.12.2 Polarization Loss Factor and Efficiency -- 2.13 Input Impedance -- 2.14 Antenna Radiation Efficiency -- 2.15 Antenna

Vector Effective Length and Equivalent Areas -- 2.15.1 Vector Effective Length -- 2.15.2 Antenna Equivalent Areas -- 2.16 Maximum Directivity and Maximum Effective Area -- 2.17 Friis Transmission Equation and Radar Range Equation -- 2.17.1 Friis Transmission Equation -- 2.17.2 Radar Range Equation -- 2.17.3 Antenna Radar Cross Section -- 2.18 Antenna Temperature -- 2.19 Multimedia -- References -- Problems.

Chapter 3 Radiation Integrals and Auxiliary Potential Functions -- 3.1 Introduction -- 3.2 The Vector Potential A for an Electric Current Source J -- 3.3 The Vector Potential F for a Magnetic Current Source M -- 3.4 Electric and Magnetic Fields for Electric (J) and Magnetic (M) Current Sources -- 3.5 Solution of the Inhomogeneous Vector Potential Wave Equation -- 3.6 Far-Field Radiation -- 3.7 Duality Theorem -- 3.8 Reciprocity and Reaction Theorems -- 3.8.1 Reciprocity for Two Antennas -- 3.8.2 Reciprocity for Antenna Radiation Patterns -- References -- Problems -- Chapter 4 Linear Wire Antennas -- 4.1 Introduction -- 4.2 Infinitesimal Dipole -- 4.2.1 Radiated Fields -- 4.2.2 Power Density and Radiation Resistance -- 4.2.3 Radian Distance and Radian Sphere -- 4.2.4 Near-Field ($kr \ll 1$) Region -- 4.2.5 Intermediate-Field ($kr \approx 1$) Region -- 4.2.6 Far-Field ($kr \gg 1$) Region -- 4.2.7 Directivity -- 4.3 Small Dipole -- 4.4 Region Separation -- 4.4.1 Far-Field (Fraunhofer) Region -- 4.4.2 Radiating Near-Field (Fresnel) Region -- 4.4.3 Reactive Near-Field Region -- 4.5 Finite Length Dipole -- 4.5.1 Current Distribution -- 4.5.2 Radiated Fields: Element Factor, Space Factor, and Pattern Multiplication -- 4.5.3 Power Density, Radiation Intensity, and Radiation Resistance -- 4.5.4 Directivity -- 4.5.5 Input Resistance -- 4.5.6 Finite Feed Gap -- 4.6 Half-Wavelength Dipole -- 4.7 Linear Elements Near or On Infinite Perfect Electric Conductors (PEC), Perfect Magnetic Conductors (PMC) and Electromagnetic Band-Gap (EBG) Surfaces -- 4.7.1 Ground Planes: Electric and Magnetic -- 4.7.2 Image Theory -- 4.7.3 Vertical Electric Dipole -- 4.7.4 Approximate Formulas for Rapid Calculations and Design -- 4.7.5 Mobile Communication Devices and Antennas for Mobile Communication Systems -- 4.7.6 Horizontal Electric Dipole -- 4.8 Ground Effects.

4.8.1 Vertical Electric Dipole -- 4.8.2 Horizontal Electric Dipole -- 4.8.3 PEC, PMC and EBG Surfaces -- 4.8.4 Earth Curvature -- 4.9 Computer Codes -- 4.10 Multimedia -- References -- Problems -- Chapter 5 Loop Antennas -- 5.1 Introduction -- 5.2 Small Circular Loop -- 5.2.1 Radiated Fields -- 5.2.2 Small Loop and Infinitesimal Magnetic Dipole -- 5.2.3 Power Density and Radiation Resistance -- 5.2.4 Near-Field ($kr \ll 1$) Region -- 5.2.5 Far-Field ($kr \gg 1$) Region -- 5.2.6 Radiation Intensity and Directivity -- 5.2.7 Equivalent Circuit -- 5.3 Circular Loop of Constant Current -- 5.3.1 Radiated Fields -- 5.3.2 Power Density, Radiation Intensity, Radiation Resistance, and Directivity -- 5.4 Circular Loop with Nonuniform Current -- 5.4.1 Arrays -- 5.4.2 Design Procedure -- 5.5 Ground and Earth Curvature Effects for Circular Loops -- 5.6 Polygonal Loop Antennas -- 5.7 Ferrite Loop -- 5.7.1 Radiation Resistance -- 5.7.2 Ferrite-Loaded Receiving Loop -- 5.8 Mobile Communication Systems Applications -- 5.9 Multimedia -- References -- Problems -- Chapter 6 Arrays: Linear, Planar, and Circular -- 6.1 Introduction -- 6.2 Two-Element Array -- 6.3 N-Element Linear Array: Uniform Amplitude and Spacing -- 6.3.1 Broadside Array -- 6.3.2 Ordinary End-Fire Array -- 6.3.3 Phased (Scanning) Array -- 6.3.4 Hansen-Woodyard End-Fire Array -- 6.4 N-Element Linear Array: Directivity -- 6.4.1 Broadside Array -- 6.4.2 Ordinary End-Fire Array -- 6.4.3 Hansen-Woodyard End-Fire Array -- 6.5 Design Procedure -- 6.6 N-Element Linear Array: Three-

Dimensional Characteristics -- 6.6.1 N-Elements Along Z-Axis -- 6.6.2 N-Elements Along X- or Y-Axis -- 6.7 Rectangular-to-Polar Graphical Solution -- 6.8 N-Element Linear Array: Uniform Spacing, Nonuniform Amplitude -- 6.8.1 Array Factor -- 6.8.2 Binomial Array -- 6.8.3 Dolph-Tschebyscheff Array: Broadside. 6.8.4 Tschebyscheff Design: Scanning -- 6.9 Superdirectivity -- 6.9.1 Efficiency and Directivity -- 6.9.2 Designs with Constraints -- 6.10 Planar Array -- 6.10.1 Array Factor -- 6.10.2 Beamwidth -- 6.10.3 Directivity -- 6.11 Design Considerations -- 6.12 Circular Array -- 6.12.1 Array Factor -- 6.13 Multimedia -- References -- Problems -- Chapter 7 Antenna Synthesis and Continuous Sources -- 7.1 Introduction -- 7.2 Continuous Sources -- 7.2.1 Line-Source -- 7.2.2 Discretization of Continuous Sources -- 7.3 Schelkunoff Polynomial Method -- 7.4 Fourier Transform Method -- 7.4.1 Line-Source -- 7.4.2 Linear Array -- 7.5 Woodward-Lawson Method -- 7.5.1 Line-Source -- 7.5.2 Linear Array -- 7.6 Taylor Line-Source (Tschebyscheff-Error) -- 7.6.1 Design Procedure -- 7.7 Taylor Line-Source (One-Parameter) -- 7.8 Triangular, Cosine, and Cosine-Squared Amplitude Distributions -- 7.9 Line-Source Phase Distributions -- 7.10 Continuous Aperture Sources -- 7.10.1 Rectangular Aperture -- 7.10.2 Circular Aperture -- 7.11 Multimedia -- References -- Problems -- Chapter 8 Integral Equations, Moment Method, and Self and Mutual Impedances -- 8.1 Introduction -- 8.2 Integral Equation Method -- 8.2.1 Electrostatic Charge Distribution -- 8.2.2 Integral Equation -- 8.3 Finite Diameter Wires -- 8.3.1 Pocklington's Integral Equation -- 8.3.2 Hallén's Integral Equation -- 8.3.3 Source Modeling -- 8.4 Moment Method Solution -- 8.4.1 Basis (Expansion) Functions -- 8.4.2 Weighting (Testing) Functions -- 8.5 Self-Impedance -- 8.5.1 Integral Equation-Moment Method -- 8.5.2 Induced EMF Method -- 8.6 Mutual Impedance Between Linear Elements -- 8.6.1 Integral Equation-Moment Method -- 8.6.2 Induced EMF Method -- 8.7 Mutual Coupling in Arrays -- 8.7.1 Coupling in the Transmitting Mode -- 8.7.2 Coupling in the Receiving Mode -- 8.7.3 Mutual Coupling on Array Performance. 8.7.4 Coupling in an Infinite Regular Array -- 8.7.5 Active Element Pattern in an Array -- 8.8 Multimedia -- References -- Problems -- Chapter 9 Broadband Dipoles and Matching Techniques -- 9.1 Introduction -- 9.2 Biconical Antenna -- 9.2.1 Radiated Fields -- 9.2.2 Input Impedance -- 9.3 Triangular Sheet, Flexible and Conformal Bow-Tie, and Wire Simulation -- 9.4 Vivaldi Antenna -- 9.5 Cylindrical Dipole -- 9.5.1 Bandwidth -- 9.5.2 Input Impedance -- 9.5.3 Resonance and Ground Plane Simulation -- 9.5.4 Radiation Patterns -- 9.5.5 Equivalent Radii -- 9.6 Folded Dipole -- 9.7 Discone and Conical Skirt Monopole -- 9.8 Matching Techniques -- 9.8.1 Stub-Matching -- 9.8.2 Quarter-Wavelength Transformer -- 9.8.3 Baluns and Transformers -- 9.9 Multimedia -- References -- Problems -- Chapter 10 Traveling Wave and Broadband Antennas -- 10.1 Introduction -- 10.2 Traveling Wave Antennas -- 10.2.1 Long Wire -- 10.2.2 V Antenna -- 10.2.3 Rhombic Antenna -- 10.3 Broadband Antennas -- 10.3.1 Helical Antenna -- 10.3.2 Electric-Magnetic Dipole -- 10.3.3 Yagi-Uda Array of Linear Elements -- 10.3.4 Yagi-Uda Array of Loops -- 10.4 Multimedia -- References -- Problems -- Chapter 11 Frequency Independent Antennas, Antenna Miniaturization, and Fractal Antennas -- 11.1 Introduction -- 11.2 Theory -- 11.3 Equiangular Spiral Antennas -- 11.3.1 Planar Spiral -- 11.3.2 Conical Spiral -- 11.4 Log-Periodic Antennas -- 11.4.1 Planar and Wire Surfaces -- 11.4.2 Dipole Array -- 11.4.3 Design of Dipole Array -- 11.5 Fundamental Limits of Electrically Small Antennas -- 11.6 Antenna Miniaturization -- 11.6.1 Monopole Antenna -- 11.6.2 Patch Antennas -- 11.6.3 Antenna

Miniaturization Using Metamaterials -- 11.7 Fractal Antennas -- 11.8
Multimedia -- References -- Problems -- Chapter 12 Aperture
Antennas -- 12.1 Introduction -- 12.2 Field Equivalence Principle:
Huygens' Principle.
12.3 Radiation Equations.
