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An engaging writing style and a strong focus on the physics make this graduate-level textbook a must-have for electromagnetism students.

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Balanis' new edition of
Advanced Engineering and
Electromagnetics
features new content on
the basics of
Metamaterials including
figures to demonstrate

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their properties.

Several small sections have been added on Mie series scattering by a PEC sphere; wedge diffraction by a wedge with surface impedances;

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and curve surface
diffraction. Throughout
the book, there are more
helpful examples, end-of-
chapter problems, and
references as well as
lecture notes in

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PowerPoint format. The revised edition also features MATLAB programs to animate some of the wave phenomena such as: propagation, reflection and refraction by planar

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interfaces; scattering
by PEC circular
cylinder, dielectric
circular cylinder,
dielectric coated PEC
circular cylinder, and
PEC sphere; and wedge

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diffraction by 2-D PEC
wedge.

Written by a leading
expert in the field,
this practical new
resource presents the
fundamentals of

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electromagnetics and antenna technology. This book covers the design, electromagnetic simulation, fabrication, and measurements for various types of

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antennas, including
impedance matching
techniques and
beamforming for
ultrawideband dipoles,
monopoles, loops, vector
sensors for direction

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finding, HF curtain
arrays, 3D printed
nonplanar patch antenna
arrays, waveguides for
portable radar,
reflector antennas, and
other antennas. It

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explores the essentials of phased array antennas and includes detailed derivations of important field equations, and a detailed formulation of the method of moments.

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This resource exhibits essential derivations of equations, providing readers with a strong foundation of the underpinnings of electromagnetics and

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antennas. It includes a complete chapter on the details of antenna and electromagnetic test and measurement. This book explores details on 3D printed non-planar

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circular patch array
antenna technology and
the design and analysis
of a planar array-fed
axisymmetric gregorian
reflector. The lumped-
element impedance

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matched antennas are examined and include a look at an analytic impedance matching solution with a parallel LC network. This book provides key insight

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into many aspects of
antenna technology that
have broad applications
in radar and
communications.

Electromagnetic
Scattering is a

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collection of studies that aims to discuss methods, state of the art, applications, and future research in electromagnetic scattering. The book

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covers topics related to the subject, which includes low-frequency electromagnetic scattering; the uniform asymptotic theory of electromagnetic edge

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diffraction; analyses of problems involving high frequency diffraction and imperfect half planes; and multiple scattering of waves by periodic and random

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distribution. Also covered in this book are topics such as theories of scattering from wire grid and mesh structures; the electromagnetic inverse

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problem; computational methods for transmission of waves; and developments in the use of complex singularities in the electromagnetic theory. Engineers and

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physicists who are interested in the study, developments, and applications of electromagnetic scattering will find the text informative and

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helpful.

Electrodynamics

0471621943 0471503169

Electromagnetic

Scattering

Time-Harmonic

Electromagnetic Fields

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Laser Engineering

One of the most methodical treatments of electromagnetic wave propagation, radiation, and scattering—including new applications and ideas Presented in two parts, this book takes an analytical approach on the

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subject and emphasizes new ideas and applications used today. Part one covers fundamentals of electromagnetic wave propagation, radiation, and scattering. It provides ample end-of-chapter problems and offers a 90-page solution manual to help

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readers check and comprehend their work. The second part of the book explores up-to-date applications of electromagnetic waves—including radiometry, geophysical remote sensing and imaging, and biomedical and signal processing applications.

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Written by a world renowned authority in the field of electromagnetic research, this new edition of Electromagnetic Wave Propagation, Radiation, and Scattering: From Fundamentals to Applications presents detailed applications

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with useful appendices, including mathematical formulas, Airy function, Abel's equation, Hilbert transform, and Riemann surfaces. The book also features newly revised material that focuses on the following topics: Statistical wave theories—which

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***have been extensively applied to topics such as geophysical remote sensing, bio-electromagnetics, bio-optics, and bio-ultrasound imaging
Integration of several distinct yet related disciplines, such as statistical wave theories,***

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communications, signal processing, and time reversal imaging New phenomena of multiple scattering, such as coherent scattering and memory effects Multiphysics applications that combine theories for different physical phenomena,

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***such as seismic coda waves,
stochastic wave theory, heat
diffusion, and temperature rise in
biological and other media
Metamaterials and solitons in
optical fibers, nonlinear
phenomena, and porous media
Primarily a textbook for graduate***

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courses in electrical engineering, Electromagnetic Wave Propagation, Radiation, and Scattering is also ideal for graduate students in bioengineering, geophysics, ocean engineering, and geophysical remote sensing. The

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book is also a useful reference for engineers and scientists working in fields such as geophysical remote sensing, bio-medical engineering in optics and ultrasound, and new materials and integration with signal processing.

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***Advanced Engineering
Electromagnetics John Wiley &
Sons***

***An advanced treatment of the
main concepts of radar.***

***Systematic and organized, it
nicely balances readability with
mathematical rigor. Many***

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techniques and examples have been chosen from the radar industry (Rayleigh fluctuating targets are used as they yield simple expressions for the probability of detection), and others for their pedagogical value (Costas signals lead the coded

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radarsignals because their ambiguity function can be intuitively deduced). Ordered statistics is covered in more depth than other CFAR techniques because its performance can be obtained analytically without resorting to simulation methods.

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Contains many exercises. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department. Balanis' second edition of Advanced Engineering

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Electromagnetics - a global best-seller for over 20 years - covers the advanced knowledge engineers involved in electromagnetic need to know, particularly as the topic relates to the fast-moving, continually evolving, and rapidly expanding

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field of wireless communications. The immense interest in wireless communications and the expected increase in wireless communications systems projects (antenna, microwave and wireless communication) points to an increase in the number of

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engineers needed to specialize in this field. In addition, the Instructor Book Companion Site contains a rich collection of multimedia resources for use with this text. Resources include: Ready-made lecture notes in Power Point format for all the

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chapters. Forty-nine MATLAB® programs to compute, plot and animate some of the wave phenomena Nearly 600 end-of-chapter problems, that's an average of 40 problems per chapter (200 new problems; 50% more than in the first edition) A

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***Electromagnetic Wave
Propagation, Radiation, and
Scattering***

***Electromagnetic Theory
From Fundamentals to
Applications***

**This text fills a need for a textbook that
presents the basic topics and**

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fundamental concepts underlying electric machines, power electronics, and electric drives for electrical engineering students at the undergraduate level. Most existing books on electric drives concentrate either on converters and waveform analysis (ignoring mechanical load

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dynamics), or on motor characteristics (giving short shrift to analysis of converters and controllers). This book provides a complete overview of the subject, at the right level for EE students. The book takes readers through the analysis and design of a complete electric drives system,

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including coverage of mechanical loads, motors, converters, sensing, and controllers. In addition to serving as a text, this book serves as a useful and practical reference for professional electric drives engineers.

Engineers do not have the time to wade through rigorously theoretical books

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when trying to solve a problem. Beginners lack the expertise required to understand highly specialized treatments of individual topics. This is especially problematic for a field as broad as electromagnetics, which propagates into many diverse engineering fields. The time h

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The discipline of antenna theory has experienced vast technological changes. In response, Constantine Balanis has updated his classic text, Antenna Theory, offering the most recent look at all the necessary topics. New material includes smart antennas and fractal antennas, along with the latest

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**applications in wireless
communications. Multimedia material
on an accompanying CD presents
PowerPoint viewgraphs of lecture notes,
interactive review questions, Java
animations and applets, and MATLAB
features. Like the previous editions,
Antenna Theory, Third Edition meets**

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the needs of electrical engineering and physics students at the senior undergraduate and beginning graduate levels, and those of practicing engineers as well. It is a benchmark text for mastering the latest theory in the subject, and for better understanding the technological applications. An

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Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

This text, directed to the microwave engineers and Master and PhD students, is on the use of electromagnetics to the development

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and design of advanced integrated components distinguished by their extended field of applications. The results of hundreds of authors scattered in numerous journals and conference proceedings are carefully reviewed and classed. Several chapters are to refresh the knowledge of readers in advanced

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electromagnetics. New techniques are represented by compact electromagnetic–quantum equations which can be used in modeling of microwave-quantum integrated circuits of future In addition, a topological method to the boundary value problem analysis is considered with the results

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and examples. One extended chapter is for the development and design of integrated components for extended bandwidth applications, and the technology and electromagnetic issues of silicon integrated transmission lines, transitions, filters, power dividers, directional couplers, etc are considered.

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Novel prospective interconnects based on different physical effects are reviewed as well. The ideas of topology is applicable to the electromagnetic signaling and computing, when the vector field maps can carry discrete information, and this area and the results in topological signaling obtained

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by different authors are analyzed, including the recently designed predicate logic processor operating spatially represented signal units. The book is rich of practical examples, illustrations, and references and useful for the specialists working at the edge of contemporary technology and

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electromagnetics.

**Theory and Computation of
Electromagnetic Fields**

**Electromagnetic Fields and Waves in
Fractional Dimensional Space**

**Tunable Materials with Applications in
Antennas and Microwaves**

Applied Electromagnetics and

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Electromagnetic Compatibility Radar Principles

In recent years, transmitarray antennas have attracted growing interest with many antenna researchers. Transmitarrays combines both optical and

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antenna array theory, leading to a low profile design with high gain, high radiation efficiency, and versatile radiation performance for many wireless communication systems. In this book, comprehensive analysis,

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new methodologies, and novel designs of transmitarray antennas are presented. Detailed analysis for the design of planar space-fed array antennas is presented. The basics of aperture field distribution and

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the analysis of the array elements are described. The radiation performances (directivity and gain) are discussed using array theory approach, and the impacts of element phase errors are

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demonstrated. The performance of transmitarray design using multilayer frequency selective surfaces (M-FSS) approach is carefully studied, and the transmission phase limit which are generally independent from

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the selection of a specific element shape is revealed. The maximum transmission phase range is determined based on the number of layers, substrate permittivity, and the separations between layers. In order to

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reduce the transmitarray design complexity and cost, three different methods have been investigated. As a result, one design is performed using quad-layer cross-slot elements with no dielectric material and another

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using triple-layer spiral dipole elements. Both designs were fabricated and tested at X-Band for deep space communications. Furthermore, the radiation pattern characteristics were studied under different feed

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polarization conditions and oblique angles of incident field from the feed. New design methodologies are proposed to improve the bandwidth of transmitarray antennas through the control of the transmission

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phase range of the elements. These design techniques are validated through the fabrication and testing of two quad-layer transmitarray antennas at Ku-band. A single-feed quad-beam transmitarray antenna with 50

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degrees elevation separation between the beams is investigated, designed, fabricated, and tested at Ku-band. In summary, various challenges in the analysis and design of transmitarray antennas

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are addressed in this book. New methodologies to improve the bandwidth of transmitarray antennas have been demonstrated. Several prototypes have been fabricated and tested, demonstrating the

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desirable features and potential
new applications of
transmitarray antennas.

Applied Electromagnetics and
Electromagnetic Compatibility
deals with Radio Frequency
Interference (RFI), which is the

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reception of undesired radio signals originating from digital electronics and electronic equipment. With today's rapid development of radio communication, these undesired signals as well as signals due to

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natural phenomena such as lightning, sparking, and others are becoming increasingly important in the general area of Electro Magnetic Compatibility (EMC). EMC can be defined as the capability of some electronic

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equipment or system to be operated at desired levels of performance in a given electromagnetic environment without generating EM emissions unacceptable to other systems operating in the vicinity.

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Analytical Modeling in Applied Electromagnetics encompasses the most complete treatment on the subject published to date, focusing on the nature of models in radio engineering. This leading-edge resource brings

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you detailed coverage of the latest topics, including metamaterials, photonic bandgaps and artificial impedance surfaces, and applies these concepts to a wide range of applications. The book

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provides you with working examples that are mainly directed to antenna applications, but the modeling methods and results can be used for other practical devices as well. This book highlights the latest

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advances in engineering
mathematics with a main focus
on the mathematical models,
structures, concepts, problems
and computational methods and
algorithms most relevant for
applications in modern

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technologies and engineering. In particular, it features mathematical methods and models of applied analysis, probability theory, differential equations, tensor analysis and computational modelling used in

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applications to important problems concerning electromagnetics, antenna technologies, fluid dynamics, material and continuum physics and financial engineering. The individual chapters cover both

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theory and applications, and include a wealth of figures, schemes, algorithms, tables and results of data analysis and simulation. Presenting new methods and results, reviews of cutting-edge research, and open

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problems for future research, they equip readers to develop new mathematical methods and concepts of their own, and to further compare and analyse the methods and results discussed. The book consists of

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contributed chapters covering research developed as a result of a focused international seminar series on mathematics and applied mathematics and a series of three focused international research

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workshops on engineering
mathematics organised by the
Research Environment in
Mathematics and Applied
Mathematics at Mälardalen
University from autumn 2014 to
autumn 2015: the International

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Mathematics, Algebra, Analysis
and Electromagnetics; and the

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1st Swedish-Estonian
International Workshop on
Engineering Mathematics,
Algebra, Analysis and
Applications. It serves as a
source of inspiration for a broad
spectrum of researchers and

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research students in applied mathematics, as well as in the areas of applications of mathematics considered in the book.

Mathematical Foundations for
Electromagnetic Theory

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Computational Electromagnetics
Modern Antenna Handbook
Analysis and Design of
Transmitarray Antennas
The New Millennium Edition:
Quantum Mechanics
This book is an electromagnetics

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classic. Originally published in 1941, it has been used by many generations of students, teachers, and researchers ever since. Since it is classic electromagnetics, every chapter continues to be referenced to this day. This classic reissue contains the entire, original edition

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first published in 1941. Additionally, two new forewords by Dr. Paul E. Gray (former MIT President and colleague of Dr. Stratton) and another by Dr. Donald G. Dudley, Editor of the IEEE Press Series on E/M Waves on the significance of the book's contribution to the field

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of Electromagnetics.

Practically all of modern physics deals with fields—functions of space (or spacetime) that give the value of a certain quantity, such as the temperature, in terms of its location within a prescribed volume.

Electrodynamics is a

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comprehensive study of the field produced by (and interacting with) charged particles, which in practice means almost all matter. Fulvio Melia's Electrodynamics offers a concise, compact, yet complete treatment of this important branch of physics. Unlike most of the

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**standard texts, Electrodynamics
neither assumes familiarity with
basic concepts nor ends before
reaching advanced theoretical
principles. Instead this book takes a
continuous approach, leading the
reader from fundamental physical
principles through to a relativistic**

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Lagrangian formalism that overlaps with the field theoretic techniques used in other branches of advanced physics. Avoiding unnecessary technical details and calculations, Electrodynamics will serve both as a useful supplemental text for graduate and advanced

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undergraduate students and as a helpful overview for physicists who specialize in other fields.

Co-published with Oxford University Press. This highly technical and thought-provoking book stresses the development of mathematical foundations for the

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application of the electromagnetic model to problems of research and technology. Features include in-depth coverage of linear spaces, Green's functions, spectral expansions, electromagnetic source representations, and electromagnetic boundary value

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problems. This book will be of interest graduate-level students in engineering, electromagnetics, physics, and applied mathematics as well as to research engineers, physicists, and scientists.

Fundamentals of Materials Science and Engineering takes an integrated

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**approach to the sequence of topics
– one specific structure,
characteristic, or property type is
covered in turn for all three basic
material types: metals, ceramics,
and polymeric materials. This
presentation permits the early
introduction of non-metals and**

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supports the engineer's role in choosing materials based upon their characteristics. Using clear, concise terminology that is familiar to students, Fundamentals presents material at an appropriate level for both student comprehension and instructors who may not have a

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materials background.

Fundamentals of Electric Drives

Modern Electrodynamics

A Student Friendly Introduction

**The Feynman Lectures on Physics,
Vol. III**

**Fundamentals of Radar Signal
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Today, the state of the art antenna technology allows the use of different types and models of antennas, depending on the area of application considered. The rapid progress in wireless communications requires the development of

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lightweight, low profile, small size, flush-mounted and wideband multi-frequency planar antennas. This book reviews recent advances in designs of various microstrip patch antenna configurations. Microstrip patch antennas have been widely

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used in the range of microwave frequencies over the past twenty-five years, and over the past few years, single-patch antennas have been extensively used in various communication systems due to their compactness, economical efficiency,

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light weight, low profile and conformability to any structure. The main drawback to implementing these antennas in many applications is their limited bandwidth. However, the most important challenge in microstrip antenna design is to

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increase the bandwidth and gain. Theoretical study of various patch antenna configurations will be carried out in this book. The study is performed by using full wave analysis and analytical techniques for the characterization of these

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structures. Several techniques are used in this book to achieve multi-band performances such as multilayer stacked patches, multiple patches and insertion of slots of different shapes and sizes in the patch antennas. In addition, some

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novel patch antenna designs for modern applications are given, and some challenges of patch antenna designs are addressed. This book is divided into seven chapters and presents new research in this dynamic field.

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Tunable Materials with Applications in Antennas and Microwaves is a stimulating topic in these modern times. With the explosion of the new generation of the wireless world, greater emphasis than ever before is being placed on the analysis and

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applications of modern materials. This book describes the characteristics of Ferrites and Ferroelectrics and introduces the reader to Multiferroics. Represents, in a simple manner, the solid state physics and explains the permittivity

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and permeability tensor characteristics for the tunable materials of infinite and finite dimensions. Gives the applications of tunable materials in resonators, filters, microstrips, striplines, antennas, phase shifters, capacitors,

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varactors, and frequency selective surfaces. Describes in detail the mathematical analysis for spin and magnetostatic waves for infinite medium, thin slab films, and finite circular discs. The analysis contains original work, which the reader may

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extend in the future. Provides multiferroics, which are ferrite and ferroelectric composites.

Multiferroics are very promising tunable materials which are believed will offer many applications in the near future. Contains the planar

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transmission lines with analytic formulas for multilayer microstrips, transmission lines, and waveguides with isotropic as well as anisotropic dielectric and magnetic materials. Also, gives the formulas to analyze the layered category of transmission

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lines with multiferroics. This book is intended for antenna and microwave engineers as well as for graduate students of Materials Science and Engineering, Electrical & Computer Engineering, and Physics Departments.

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Electromagnetics is too important in too many fields for knowledge to be gathered on the fly. A deep understanding gained through structured presentation of concepts and practical problem solving is the best way to approach this important

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subject. Fundamentals of Engineering Electromagnetics provides such an understanding, distilling the most important theoretical aspects and applying this knowledge to the formulation and solution of real engineering

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problems. Comprising chapters drawn from the critically acclaimed Handbook of Engineering Electromagnetics, this book supplies a focused treatment that is ideal for specialists in areas such as medicine, communications, and remote

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sensing who have a need to understand and apply electromagnetic principles, but who are unfamiliar with the field. Here is what the critics have to say about the original work "...accompanied with practical engineering

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applications and useful illustrations, as well as a good selection of references ... those chapters that are devoted to areas that I am less familiar with, but currently have a need to address, have certainly been valuable to me. This book will

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therefore provide a useful resource for many engineers working in applied electromagnetics, particularly those in the early stages of their careers." -Alastair R. Ruddle, The IEE Online "...a tour of practical electromagnetics written

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by industry experts ... provides an excellent tour of the practical side of electromagnetics ... a useful reference for a wide range of electromagnetics problems ... a very useful and well-written compendium..." -Alfy Riddle, IEEE

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Microwave Magazine Fundamentals of Engineering Electromagnetics lays the theoretical foundation for solving new and complex engineering problems involving electromagnetics.

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Introduction to Smart Antennas
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Engineering Mathematics I

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Microwave Engineering

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aspects of the phenomena
are clearly explained.

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representations are
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'Basic Laws of

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Electromagnetism' is a book describing the Fundamental Laws of Electromagnetism with allied examples to help and enable the readers to attain a deeper

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understanding of the subject and visualize the wide range of applications of the ideas discussed. The book lays emphasis on the physical aspects of the phenomena, avoiding

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superfluous mathematical formulae. The textbook is quite handy for the students of senior secondary and undergraduate levels, and also for various

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engineering and medical
entrance examinations.

This is newly typeset
print of a 'Classical
Book' in Physics.

New edition features
improved typography,

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figures and tables,
expanded indexes, and 885
new corrections.

Pozar's new edition of
Microwave Engineering
includes more material on
active circuits, noise,

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nonlinear effects, and wireless systems. Chapters on noise and nonlinear distortion, and active devices have been added along with the coverage of noise and more material on

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intermodulation distortion
and related nonlinear
effects. On active
devices, there's more
updated material on
bipolar junction and field
effect transistors. New

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and updated material on wireless communications systems, including link budget, link margin, digital modulation methods, and bit error rates is also part of the

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new edition. Other new material includes a section on transients on transmission lines, the theory of power waves, a discussion of higher order modes and frequency

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effects for microstrip
line, and a discussion of
how to determine unloaded.
Learning Electrodynamics
doesn't have to be boring
What if there was a way to
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without all the usual fluff? What if there were a book that allowed you to see the whole picture and not just tiny parts of it? Thoughts like this are the reason that No-Nonsense

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Electrodynamics now exists. What will you learn from this book? Get to know all fundamental electrodynamical concepts –Grasp why we can describe electromagnetism using the

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electric and magnetic
field, the electromagnetic
field tensor and the
electromagnetic potential
and how these concepts are
connected. Learn to
describe Electrodynamics

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mathematically –

Understand the meaning and
origin of the most
important equations:

Maxwell's equations & the
Lorentz force law. Master
the most important

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calculations and
understand the general
algorithm we use to
describe them. Get an
understanding you can be

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its origins to
Electrodynamics and how we
can understand it as a
gauge theory. No-Nonsense
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most student-friendly book on Electrodynamics ever written. Here's why. First of all, it's is nothing like a formal university lecture. Instead, it's like a casual conversation

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with a more experienced student. This also means that nothing is assumed to be “obvious” or “easy to see”. Each chapter, each section, and each page focusses solely on the

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carefully step-by-step.
This makes it much easier
to understand what's going
on in. Whenever a concept
is used which was already
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there is a short sidenote

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serious reader to undertake antenna design from first principles. To accomplish these goals, the authors bring together their contributions from both industry and the academic environment. The developments of the various topics start at a level

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which is accessible to a novice in the speciality, but give a treatment which culminates at an advanced level. Another important feature of the book is its use of practical examples illustrating real engineering problems and designs.

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In most cases, the explanation is sufficient to grasp the principles of operation of the related equipment, and, where appropriate, the reader is referred to a relevant bibliography for more complete and hence more sophisticated methodologies of

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design. Of particular note are the chapters on specialist subjects such as antennas and signal theory, and signal processing antennas, showing how the antenna may be combined with signal processing techniques in imaging applications, in angular

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superresolution, and in adaptive arrays to suppress interference and jamming. Another example is the chapter on the use of polarimetry to enhance the wealth of information which may be extracted, for example, from radar signals.

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