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* A learner-friendly,
practical and
example driven
book, Wireless
Communication
Systems in Matlab
gives you a solid
background in
building simulation

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models for wireless systems in Matlab. This book, an essential guide for understanding the basic implementation aspects of a wireless system, shows how to simulate and model such a system from scratch. The implemented

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simulation models shown in this book, provide an opportunity for an engineer to understand the basic implementation aspects of modeling various building blocks of a wireless communication system. It presents the following key

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topics with the required theoretical background, along with the implementation details in the form of Matlab scripts. *

Random variables for simulating probabilistic systems and applications like Jakes filter design and colored noise

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generation. * Models
for Shannon's
channel capacity,
unconstrained awgn
channel, binary
symmetric channel
(BSC), binary
erasure channel
(BEC), constellation
constrained
capacities and
ergodic capacity
over fading channel.

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The theory of linear block codes, decoding techniques using soft-decisions and hard-decisions, and their performance simulations. * Monte Carlo simulation for ascertaining performance of digital modulation techniques in AWGN

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and fading channels
- Eb/N0 Vs BER
curves. Pulse
shaping techniques,
matched filtering and
partial response
signaling, Design
and implementation
of linear equalizers -
zero forcing and
MMSE equalizers,
using them in a
communication link

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and modulation systems with receiver impairments. * Large-scale propagation models like Friis free space model, log distance model, two ray ground reflection model, single knife-edge diffraction model, Hata Okumura model. *

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Essentials of small-scale propagation models for wireless channels, such as, power delay profile, Doppler power spectrum, Rayleigh and Rice processes. Modeling flat fading and frequency selective channels. * Diversity techniques for multiple antenna

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systems: Alamouti
space-time coding,
maximum ratio
combining, equal
gain combining and
selection combining.
* Simulation models
for direct sequence
spread spectrum,
frequency hopping
spread spectrum
and OFDM.

This interdisciplinary

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book presents numerical techniques needed for chemical and biological engineers using Matlab. The book begins by exploring general cases, and moves on to specific ones. The text includes a large number of detailed illustrations,

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exercises and industrial examples. The book provides detailed mathematics and engineering background in the appendixes, including an introduction to Matlab. The text will be useful to undergraduate

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students in
chemical/biological
engineering, and in
applied mathematics
and numerical
analysis.

This book provides
an introduction to the
inverse eigenvalue
problem for graphs
(IEP- G) and the
related area of zero
forcing, propagation,

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and throttling. The IEP- G grew from the intersection of linear algebra and combinatorics and has given rise to both a rich set of deep problems in that area as well as a breadth of “ancillary” problems in related areas. The IEP- G asks a fundamental

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mathematical question expressed in terms of linear algebra and graph theory, but the significance of such questions goes beyond these two areas, as particular instances of the IEP- G also appear as major research problems in other

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fields of mathematics, sciences and engineering. One approach to the IEP- G is through rank minimization, a relevant problem in itself and with a large number of applications. During the past 10 years, important

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developments on the rank minimization problem, particularly in relation to zero forcing, have led to significant advances in the IEP- \mathbb{R} . The monograph serves as an entry point and valuable resource that will stimulate future developments in this active and

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mathematically
diverse research
area.

System Dynamics
for Engineering
Students: Concepts
and Applications
discusses the basic
concepts of
engineering system
dynamics.

Engineering system
dynamics focus on

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deriving mathematical models based on simplified physical representations of actual systems, such as mechanical, electrical, fluid, or thermal, and on solving the mathematical models. The resulting solution is

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utilized in design or analysis before producing and testing the actual system. The book discusses the main aspects of a system dynamics course for engineering students; mechanical, electrical, and fluid and thermal system

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modeling; the Laplace transform technique; and the transfer function approach. It also covers the state space modeling and solution approach; modeling system dynamics in the frequency domain using the sinusoidal (harmonic) transfer

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function; and
coupled-field
dynamic systems.
The book is
designed to be a one-
semester system-
dynamics text for
upper-level
undergraduate
students with an
emphasis on
mechanical,
aerospace, or

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electrical

engineering. It is also
useful for

understanding the
design and

development of
micro- and macro-
scale structures,

electric and fluidic
systems with an

introduction to
transduction, and

numerous

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simulations using
MATLAB and
SIMULINK. The first
textbook to include a
chapter on the
important area of
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more balanced
treatment of
mechanical and
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making it appealing

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Heuristic Signal
Processing and
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Multi-Carrier
Communication
Systems with

Examples in
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This book

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discusses the latest channel coding techniques, MIMO systems, and 5G channel coding evolution. It provides a comprehensive overview of channel coding, covering modern techniques such

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as turbo codes,
low-density parity-
check (LDPC)
codes, space – time
coding, polar
codes, LT codes,
and Raptor codes
as well as the
traditional codes
such as cyclic
codes, BCH, RS
codes, and

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convolutional codes. It also explores MIMO communications, which is an effective method for high-speed or high-reliability wireless communications. It also examines the evolution of 5G

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channel coding techniques. Each of the 13 chapters features numerous illustrative examples for easy understanding of the coding techniques, and MATLAB-based programs are integrated in the

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text to enhance readers' grasp of the underlying theories. Further, PC-based MATLAB m-files for illustrative examples are included for students and researchers involved in

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advanced and current concepts of coding theory. Digital Modulations using Matlab is a learner-friendly, practical and example driven book, that gives you a solid background in building simulation

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models for digital modulation systems in Matlab. This book, an essential guide for understanding the implementation aspects of a digital modulation system, shows how to simulate and model a digital

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modulation system from scratch. The implemented simulation models shown in this book, mostly will not use any of the inbuilt communication toolbox functions and hence provide an opportunity for

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an engineer to understand the basic implementation aspects of modeling various building blocks of a digital modulation system. It presents the following key topics with

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required

theoretical
background along
with the
implementation
details in the form
of Matlab scripts.*
Basics of signal
processing
essential for
implementing
digital modulation

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techniques -
generation of test
signals,
interpreting FFT
results, power and
energy of a signal,
methods to
compute
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analytic signal and
applications.*

Waveform and

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complex
equivalent
baseband
simulation
models.* Digital
modulation
techniques
covered: BPSK
and its variants,
QPSK and its
variants, M-ary
PSK, M-ary QAM,

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M-ary PAM, CPM,
MSK, GMSK, M-
ary FSK. * Monte
Carlo simulation
for ascertaining
performance of
digital modulation
techniques in
AWGN and fading
channels - E_b/N_0
Vs BER curves.*

Design and

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implementation of
linear equalizers -
Zero forcing and
MMSE equalizers,
using them in a
communication
link.* Simulation
and performance
of modulation
systems with
receiver
impairments

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MIMO-OFDM is a key technology for next-generation cellular communications (3GPP-LTE, Mobile WiMAX, IMT-Advanced) as well as wireless LAN (IEEE 802.11a, IEEE 802.11n), wireless

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PAN (MB-OFDM),
and broadcasting
(DAB, DVB, DMB).
In MIMO-OFDM
Wireless
Communications
with MATLAB®,
the authors
provide a
comprehensive
introduction to the
theory and

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practice of wireless channel modeling, OFDM, and MIMO, using MATLAB® programs to simulate the various techniques on MIMO-OFDM systems. One of the only books in the area dedicated to explaining

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in wireless
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technicians in
wireless

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fields, graduate
students in signal
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majoring in
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will find this book a
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introduction to the

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coverage of the
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technology of

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systems (OWC).

The delivery
method makes the
book appropriate
for students
studying at
undergraduate and
graduate levels as
well as
researchers and

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professional engineers working in the field of OWC. The book gives a detailed description of OWC, focusing mainly on the infrared and visible bands, for indoor and outdoor applications. A

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major attraction of the book is the inclusion of Matlab codes and simulations results as well as experimental test-beds for free space optics and visible light communication systems. This

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valuable resource will aid the readers in understanding the concept, carrying out extensive analysis, simulations, implementation and evaluation of OWC links. This 2nd edition is structured into

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Fundamental principles Optical source and detector and noise sources

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equalization,
diversity
techniques
Channel models
and system
performance
analysis Visible
light
communications
Terrestrial free
space optics

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communications
Relay-based free
space optics
communications
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number of Matlab
based simulation
codes are included
in this 2nd edition
to assist the
readers in
mastering the

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subject and most importantly to encourage them to write their own simulation codes and enhance their knowledge.

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practical guide to
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concepts Wireless
technologies and
services have
evolved significantly
over the last couple
of decades, and
Wireless

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Communication
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the most recent
advances in
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systems and
concepts grounded
in a practical and
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perspective. Written
by a noted expert on

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the topic, the book provides the information needed to model, simulate, test, and analyze wireless system and wireless circuits using modern instrumentation and computer aided design software. Designed as a practical resource,

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the book provides a clear understanding of the basic theory, software simulation, hardware test, and modeling, system component testing, software and hardware interactions and co-simulations. This important book:
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systems Covers a
range of systems
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Presents
information on
testing and
measurement of
wireless

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Communication

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Signals introduces wireless communication systems and concepts from both a practical and laboratory perspective.

Through four previous editions of Advanced Engineering Mathematics with

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MATLAB, the author presented a wide variety of topics needed by today's engineers. The fifth edition of that book, available now, has been broken into two parts: topics currently needed in mathematics courses and a new stand-alone volume

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presenting topics not often included in these courses and consequently unknown to engineering students and many professionals. The overall structure of this new book consists of two parts: transform methods and

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random processes.

Built upon a foundation of applied complex variables, the first part covers advanced transform methods, as well as z-transforms and Hilbert transforms--t ransforms of particular interest to systems,

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communication, and
electrical engineers.

This portion

concludes with

Green's function, a
powerful method of
analyzing systems.

The second portion
presents random pr
ocesses--processes
that more accurately
model physical and
biological

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engineering. Of particular interest is the inclusion of stochastic calculus. The author continues to offer a wealth of examples and applications from the scientific and engineering literature, a highlight of his previous books. As before,

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theory is presented first, then examples, and then drill problems. Answers are given in the back of the book.

This book is all about the future: The purpose of this book is not only to educate the present generation of engineers but also

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the next. "The main strength is the text is written from an engineering perspective. The majority of my students are engineers. The physical examples are related to problems of interest to the engineering students." --Lea

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fundamental issues,

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electromagnetic
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by which to use
MATLAB as a
powerful tool to
motivate students
and illustrate
essential theory
without having to
customize the
applications
themselves; the
latter will find
relevant problems
quickly and easily.

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The book includes numerous MATLAB-based simulations and examples of communication systems, while providing a good balance of theory and hands-on computer experience. This Updated Printing revises the book

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Signals

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Transfer function

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form, zpk, state space, modal, and state space modal forms. For someone learning dynamics for the first time or for engineers who use the tools infrequently, the options available for constructing and representing dynamic mechanical

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models can be daunting. It is important to find a way to put them all in perspective and have them available for quick reference. It is also important to have a strong understanding of modal analysis, from which the total response of a

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similarities between
different models by
tracking a single
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the complete,
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code used to solve
each problem*

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how to take the
results of a realistic
ANSYS finite
element model and
develop a small
MATLAB state-
space model
Provides a solid
grounding in how
individual modes of
vibration combine
for overall system*

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response

*This book provides
a detailed overview
of detection
algorithms for
multiple-input
multiple-output
(MIMO)
communications
systems focusing on
their hardware
realisation. The
book begins by*

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analysing the maximum likelihood detector, which provides the optimal bit error rate performance in an uncoded communications system. However, the maximum likelihood detector experiences a high complexity that

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scales exponentially with the number of antennas, which makes it impractical for real-time communications systems. The authors proceed to discuss lower-complexity detection algorithms such as zero-forcing, sphere decoding, and the K-

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best algorithm, with the aid of detailed algorithmic analysis and several MATLAB code examples.

Furthermore, different design examples of MIMO detection algorithms and their hardware implementation results are

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*presented and
discussed. Finally,
an ASIC design flow
for implementing
MIMO detection
algorithms in
hardware is
provided, including
the system
simulation and
modelling steps and
register transfer
level modelling*

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*using hardware
description
languages. Provides
an overview of
MIMO detection
algorithms and
discusses their
corresponding
hardware
implementations in
detail; Highlights
architectural
considerations of*

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MIMO detectors in achieving low power consumption and high throughput; Discusses design tradeoffs that will guide readers' efforts when implementing MIMO algorithms in hardware; Describes a broad range of

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implementations of different MIMO detectors, enabling readers to make informed design decisions based on their application requirements.

Spread spectrum and CDMA are cutting-edge technologies widely used in operational

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*radar, navigation
and
telecommunication
systems and play a
pivotal role in the
development of the
forthcoming
generations of
systems and
networks. This
comprehensive
resource presents
the spread spectrum*

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concept as a product of the advancements in wireless IT, shows how and when the classical problems of signal transmission/processing stimulate the application of spread spectrum, and clarifies the advantages of

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spread spectrum philosophy. Detailed coverage is provided of the tools and instruments for designing spread spectrum and CDMA signals answering why a designer will prefer one solution over another. The approach adopted is

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*wide-ranging,
covering issues that
apply to both data
transmission and
data collection
systems such as
telecommunications,
radar, and
navigation. Presents
a theory-based
analysis
complemented by
practical examples*

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and real world case studies resulting in a self-sufficient treatment of the subject Contains detailed discussions of new trends in spread spectrum technology such as multi-user reception, multicarrier modulation, OFDM, MIMO and space-

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time coding

*Provides advice on
designing discrete
spread spectrum
signals and signal
sets for time-
frequency
measuring,
synchronization and
multi-user
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*problems and other
exercises to
encourage the
reader to initiate
independent
investigations and
simulations This
valuable text
provides timely
guidance on the
current status and
future potential of
spread spectrum*

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*and CDMA and is
an invaluable
resource for senior
undergraduates and
postgraduate
students, lecturers
and practising
engineers and
researchers
involved in the
deployment and
development of
spread spectrum*

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problems and
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programming,
electronic versions
of some of the*

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figures and other useful resources such as a list of abbreviations. This is the first textbook that contains a holistic treatment of antennas both for traditional antennas mounted on masts (Line-of-Sight antenna systems)

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and for small antennas used on modern wireless devices such as smart phones being subject to signal variations (fading) due to multipath propagation. The focus is on characterization, as well as describing classical antennas

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by modern complex vector theory - thereby linking together many disciplines such as electromagnetic theory, classical antenna theory, wave propagation, and antenna system performance.

Overall, this book represents a

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rethinking of the way basic antenna theory is presented. The book contains many references to important old and new papers and books on the analysis and design of the most useful antenna types, for the most interested readers.

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Advances in
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*Channel Coding
Techniques for
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MATLAB® and
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Second Edition*
Advances in
Computing,
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Automation and
Biomedical
Technology aims
to bring together
leading academic,
scientists,
researchers,
industry
representatives,
postdoctoral
fellows and
research scholars
around the world

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to share their
knowledge and
research expertise,
to advances in the
areas of
Computing,
Communication,
Electrical, Civil,
Mechanical and
Biomedical
Systems as well as
to create a
prospective

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challenges
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FOURIER SERIES (

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1.2.1 Time-Shifting
Property.....

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1.2.2 Frequency-
Shifting Property ..

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1.2.3 Modulation P
roperty.....

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TIME FOURIER
TRANSFORM (CTF

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1.4 PROPERTIES
OF CTFT.....

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13 1.4.1 Linearity...

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1.4.2 Conjugate Sy

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1.4.3 Real
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1.4.7 Parseval
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with coverage of the WLAN toolbox with OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source

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Professor with the

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Electrical and

Computer

Engineering at

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He received his
PhD from the
Electrical
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Florida,
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Technology and Education funded by the National Science Foundation. His earlier work on computer vision to help persons with blindness led to his testimony to the U.S. Senate on the committee of Veterans Affairs

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on the subject of technology to help persons with disabilities. His research interests are in imaging, signal processing and machine learning, with applications in brain research and assistive technology.

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Armando Barreto,
PhD, is Professor
of the Electrical
and Computer
Engineering
Department at
Florida
International
University, Miami,
as well as the
Director of FIU's
Digital Signal
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Laboratory, with more than 25 years of experience teaching DSP to undergraduate and graduate students. He earned his PhD in electrical engineering from the University of Florida, Gainesville. His work has focused

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on applying DSP techniques to the facilitation of human-computer interactions, particularly for the benefit of individuals with disabilities. He has developed human-computer interfaces based on the processing

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of signals and has developed a system that adds spatialized sounds to the icons in a computer interface to facilitate access by individuals with "low vision." With his research team, he has explored the use of

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Rate and Gravity
(MARG) sensor
modules and
Inertial
Measurement
Units (IMUs) for
human-computer
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applications. He is
a senior member
of the Institute of
Electrical and
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Engineers (IEEE)
and the
Association for
Computing
Machinery (ACM).
Francisco R.
Ortega, PhD, is an
Assistant
Professor at
Colorado State
University and
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Natural User

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Interaction Lab

(NUILAB). Dr.

Ortega earned his
PhD in Computer
Science (CS) in the
field of Human-
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Interaction (HCI)

and 3D User

Interfaces (3DUI)

from Florida

International

University (FIU).

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He also held a position of Post-Doc and Visiting Assistant Professor at FIU. His main research area focuses on improving user interaction in 3DUI by (a) eliciting (hand and full-body) gesture and multimodal

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interactions, (b) developing techniques for multimodal interaction, and (c) developing interactive multimodal recognition systems. His secondary research aims to discover how to

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SUI, and IEEE
3DUI, among
others. He is the
first-author of the
CRC Press book
Interaction Design
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Development.

Nonnarit O-
larnnithipong,
PhD, is an
Instructor at
Florida

International
University. Dr. O-
larnnithipong
earned his PhD in
Electrical
Engineering,
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Signal Processing
from Florida
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University (FIU).
He also held a
position of Post-
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senior product manager with MathWorks, based in Massachusetts, USA. Within his 12 years at MathWorks, he has been responsible for multiple signal processing and communications software tools. Prior to MathWorks, he was a research scientist in the Wireless Group at Nortel Networks, where

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he contributed to multiple standardization projects for 3G mobile technologies. He has been awarded multiple patents on topics related to computersimulations. He holds a BSc degree in Electrical Engineering from McGill University and MSc and PhD degrees in Telecommunications from the

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communication and computer engineering. Topics covered include smart grids, soft computing techniques in power systems, smart energy management systems, power electronics, feedback control systems, biomedical engineering, geo informative systems, grid computing, data mining, image and

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signal processing, video processing, computer vision, pattern recognition, cloud computing, pervasive computing, intelligent systems, artificial intelligence, neural network and fuzzy logic, broad band communication, mobile and optical communication, network security, VLSI,

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book covers the most fundamental aspects of linear vibration analysis for mechanical engineering students and engineers. Consisting of five major

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topics, each has its own chapter and is aligned with five major objectives of the book. It starts from a concise, rigorous and yet accessible introduction to Lagrangian

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dynamics as a tool for obtaining the governing equation(s) for a system, the starting point of vibration analysis. The second topic introduces mathematical tools for

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develop
student's
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symbolic
calculations,
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introduces the
lumped-
parameter

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adds more coverage of damping, new case studies, and development of the control aspects in vibration analysis. A MATLAB appendix has also been added to help students with

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systems; radar
spectrum
sharing with
coordinated
multipoint
systems (CoMP);
and spectrum
sharing with
overlapped MIMO
radars. The
primary
audience is the
radar and

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wireless
communication
community,
specifically
people in
industry,
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focus is on
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proposes
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frequency
division
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high

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frequency
offsets and
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and the high
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new

interleaving
scheme for
multicarrier
communication,
the book starts
with a detailed
overview of
multi-carrier
systems such as
OFDM, multi-
carrier code
division

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multiple access
(MC-CDMA), and
single-carrier
frequency
division
multiple access
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systems. From
there, it
proposes a new
way to deal
with the freque
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fading channel:
the single-
carrier with
frequency
domain
equalization
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scheme. The
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examines the
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the continuous

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phase

modulation

(CPM)-based

OFDM (CPM-OFDM)

system. It

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based single-

carrier

frequency

domain

equalization

(CPM-SC-FDE)

structure for

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broadband
wireless
communication
systems. In the
third part of
the book, the
author proposes
a chaotic
interleaving
scheme for both
CPM-OFDM and
the CPM-SC-FDE
systems. A

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comparison
between the
proposed
chaotic
interleaving
and the
conventional
block
interleaving is
also performed
in this part.
The final part
of the book

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presents

efficient image
transmission
techniques over
multi-carrier
systems such as
OFDM, MC-CDMA,
and SC-FDMA. It
details a new
approach for
efficient image
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over OFDM and

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MC-CDMA systems using chaotic interleaving that transmits images over wireless channels efficiently. The book studies the performance of discrete cosine transform-based

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single-carrier
frequency
division
multiple access
(DCT-SC-FDMA)
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and digital
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analysis of
signals
Discrete-time
filters and
recursive
filters Each
chapter begins
with chapter
objectives and
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address
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engineering,
statistics, and
all others in
which computer
techniques may
assist.

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three
successful
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editions. It is
written for
today's STEM
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technology,
engineering,
and
mathematics)
student. Three
assumptions

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under lie its
structure: (1)
All students
need a firm
grasp of the
traditional
disciplines of
ordinary and
partial
differential
equations,
vector calculus
and linear

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algebra. (2)

The modern student must have a strong foundation in transform methods because they provide the mathematical basis for electrical and communication

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studies. (3)

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revolution
requires an
understanding
of stochastic
(random)
processes. The
chapter on
Complex
Variables,
positioned as
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chapter in
previous
editions, is
now moved to
Chapter 10. The
author employs
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MIMO-OFDM
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can be handled.
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one of the
characteristics
of this
technology is
large variations
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dependent on
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in any given
cell. This
becomes
increasingly
problematic
when we are
creating a
society where
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entertainment,
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autonomous
vehicles are all
relying on
wireless
connectivity the
primary goal for
future mobile
networks should**

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**not be to
increase the
peak rates, but
the rates that
can be
guaranteed to
the vast
majority of the
locations in the
geographical
coverage area.
The cellular**

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network

**architecture was
not designed for
high-rate data
services but for
low-rate voice
services, thus it
is time to look
beyond the
cellular
paradigm and
make a clean-**

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design that can
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