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While the prediction of observations is a forward problem, the use of actual observations to infer the properties of a model is an inverse problem. Inverse

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problems are difficult because they may not have a unique solution. The description of uncertainties plays a central role in the theory, which is based on probability theory. This book proposes a general approach that is valid for linear as well as for nonlinear problems. The philosophy is

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essentially probabilistic and allows the reader to understand the basic difficulties appearing in the resolution of inverse problems. The book attempts to explain how a method of acquisition of information can be applied to actual real-world problems, and many of the arguments are

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heuristic.

In many physical sciences, the most natural description of a system is with a function of position or time. In principle, infinitely many numbers are needed to specify that function, but in practice only finitely many measurements can be made. Inverse

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theory concerns the mathematical techniques that enable researchers to use the available information to build a model of the unknown system or to determine its essential properties. In Geophysical Inverse Theory, Robert Parker provides a systematic development of inverse theory at the

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graduate and professional level that emphasizes a rigorous yet practical solution of inverse problems, with examples from experimental observations in geomagnetism, seismology, gravity, electromagnetic sounding, and interpolation. Although illustrated with examples from

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geophysics, this book has broad implications for researchers in applied disciplines from materials science and engineering to astrophysics, oceanography, and meteorology. Parker's approach is to avoid artificial statistical constructs and to emphasize instead the reasonable assumptions

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researchers must make to reduce the ambiguity that inevitably arises in complex problems. The structure of the book follows a natural division in the subject into linear theory, in which the measured quantities are linear functionals of the unknown models, and nonlinear theory, which covers all

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other systems but is not nearly so well understood. The book covers model selection as well as techniques for drawing firm conclusions about the earth independent of any particular model.

This book sheds light on networked control systems; it describes different

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techniques for asynchronous control, moving away from the periodic actions of classical control, replacing them with state-based decisions and reducing the frequency with which communication between subsystems is required. The text focuses specially on event-based control. Split into two

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parts, Asynchronous Control for Networked Systems begins by addressing the problems of single-loop networked control systems, laying out various solutions which include two alternative model-based control schemes (anticipatory and predictive) and the use of H_2/H_∞

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robust control to deal with network delays and packet losses. Results on self-triggering and send-on-delta sampling are presented to reduce the need for feedback in the loop. In Part II, the authors present solutions for distributed estimation and control. They deal first with reliable networks

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and then extend their results to scenarios in which delays and packet losses may occur. The novel results presented in *Asynchronous Control for Networked Systems* are transmitted in a concise and clear style supported by simulation and experimental examples. Some

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applications are also provided. Academic researchers and graduate students investigating control theory, control engineering and computer communications systems can use this monograph to learn how asynchronous control helps tackle the problems of networked systems in

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centralized and distributed schemes. Control practitioners at work in power systems, vehicle coordination and traffic networks will also find this book helpful in improving the performance of their systems. This textbook provides students, researchers, and engineers in the area

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of electrical engineering with advanced mathematical optimization methods. Presented in a readable format, this book highlights fundamental concepts of advanced optimization used in electrical engineering. Chapters provide a collection that ranges from simple yet

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important concepts such as unconstrained optimization to highly advanced topics such as linear matrix inequalities and artificial intelligence-based optimization methodologies. The reader is motivated to engage with the content via numerous application examples of optimization

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in the area of electrical engineering. The book begins with an extended review of linear algebra that is a prerequisite to mathematical optimization. It then precedes with unconstrained optimization, convex programming, duality, linear matrix inequality, and intelligent optimization

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methods. This book can be used as the main text in courses such as Engineering Optimization, Convex Engineering Optimization, Advanced Engineering Mathematics and Robust Optimization and will be useful for practicing design engineers in electrical engineering fields. Author

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provided cases studies and worked examples are included for student and instructor use.

Optimization Concepts and Applications in Engineering
III: Variational Methods and Optimization
Economic Dynamics

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Improved Resource Allocation
Algorithms

Design and Analysis

H-infinity Control and Estimation of
State-multiplicative Linear Systems

*David G. Luenberger's Investment
Science has become the dominant
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Senior or Masters level engineering, economics and statistics programs, as well as the programs in Financial Engineering. The author gives thorough yet highly accessible mathematical coverage of the fundamental topics of introductory investments: fixed-income securities,

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modern portfolio theory and capital asset pricing theory, derivatives (futures, options, and swaps), and innovations in optimal portfolio growth and valuation of multi period risky investments. Throughout the text, Luenberger uses mathematics to present essential ideas about

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investments and their applications in business practice. The new edition is updated to include the significant advances in financial theory and practice. The text now includes two new chapters on Risk Measurement and Credit Risk and the expanded use of so-called real options, the

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characterization of volatility changes, and methods for incorporating such behavior in valuation. New exercise material and modifications to reflect the most recent financial changes have been made to nearly all chapters in this second edition. Covers the latest practices, challenges

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and theoretical advancements in the domain of balancing economic efficiency and operation risk mitigation
This book examines both system operation and market operation perspectives, focusing on the interaction between the two. It incorporates up-to-date field

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experiences, presents challenges, and summarizes the latest theoretic advancements to address those challenges. The book is divided into four parts. The first part deals with the fundamentals of integrated system and market operations, including market power mitigation, market efficiency

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evaluation, and the implications of operation practices in energy markets. The second part discusses developing technologies to strengthen the use of the grid in energy markets. System volatility and economic impact introduced by the intermittency of wind and solar generation are also

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addressed. The third part focuses on stochastic applications, exploring new approaches of handling uncertainty in Security Constrained Unit Commitment (SCUC) as well as the reserves needed for power system operation. The fourth part provides ongoing efforts of utilizing transmission facilities

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to improve market efficiency, via transmission topology control, transmission switching, transmission outage scheduling, and advanced transmission technologies. Besides the state-of-the-art review and discussion on the domain of balancing economic efficiency and operation risk mitigation,

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this book: Describes a new approach for mass market demand response management, and introduces new criteria to improve system performance with large scale variable generation additions Reviews mathematic models and solution methods of SCUC to help address challenges posed by

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increased operational uncertainties with high-penetration of renewable resources Presents a planning framework to account for the value of operational flexibility in transmission planning and to provide market mechanism for risk sharing Power Grid Operations in a Market Environment:

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Economic Efficiency and Risk Mitigation is a timely reference for power engineers and researchers, electricity market traders and analysts, and market designers.

The purpose of this annual series, Applied and Computational Control, Signals, and Circuits, is to keep

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abreast of the fast-paced developments in computational mathematics and scientific computing and their increasing use by researchers and engineers in control, signals, and circuits. The series is dedicated to fostering effective communication between

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mathematicians, computer scientists, computational scientists, software engineers, theorists, and practicing engineers. This interdisciplinary scope is meant to blend areas of mathematics (such as linear algebra, operator theory, and certain branches of analysis) and computational

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mathematics (numerical linear algebra, numerical differential equations, large scale and parallel matrix computations, numerical optimization) with control and systems theory, signal and image processing, and circuit analysis and design. The disciplines mentioned above have long enjoyed a natural

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synergy. There are distinguished journals in the fields of control and systems theory, as well as signal processing and circuit theory, which publish high quality papers on mathematical and engineering aspects of these areas; however, articles on their computational and applications

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aspects appear only sporadically. At the same time, there has been tremendous recent growth and development of computational mathematics, scientific computing, and mathematical software, and the resulting sophisticated techniques are being gradually adapted by engineers,

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software designers, and other scientists to the needs of those applied disciplines.

Finally, there is now a new edition of Professor Gandolfo`s acclaimed text on Economic Dynamics. Long out of print, but still in demand, this completely rewritten and updated

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edition treats all of the mathematical methods used in economic dynamics, from elementary linear difference and differential equations and simultaneous systems to the qualitative analysis of non-linear dynamical systems.

Convex Optimization

Numerical Methods for Linear Control

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Systems

*An Introduction to Mathematical
Finance with Applications*

Youla Parameterization Approach

A Practical Approach

*Inverse Problem Theory and Methods
for Model Parameter Estimation*

The third edition of this well known

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text continues to provide a solid foundation in mathematical analysis for undergraduate and first-year graduate students. The text begins with a discussion of the real number system as a complete ordered field. (Dedekind's

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construction is now treated in an appendix to Chapter 1.) The topological background needed for the development of convergence, continuity, differentiation and integration is provided in Chapter 2. There is a new section on the

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gamma function, and many new and interesting exercises are included. This text is part of the Walter Rudin Student Series in Advanced Mathematics.

During the last decade the techniques of non-linear optim

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ization have emerged as an important subject for study and research. The increasingly widespread application of optimization has been stimulated by the availability of digital computers, and the necessity of using them in

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the investigation of large systems. This book is an introduction to non-linear methods of optimization and is suitable for undergraduate and post graduate courses in mathematics, the physical and social sciences, and engineering.

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The first half of the book covers the basic optimization techniques including linear search methods, steepest descent, least squares, and the Newton-Raphson method.

These are described in detail, with worked numerical examples, since

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they form the basis from which advanced methods are derived. Since 1965 advanced methods of unconstrained and constrained optimization have been developed to utilise the computational power of the digital computer. The second

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half of the book describes fully important algorithms in current use such as variable metric methods for unconstrained problems and penalty function methods for constrained problems. Recent work, much of which has

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not yet been widely applied, is reviewed and compared with currently popular techniques under a few generic main headings. vi
PREFACE Chapter I describes the optimization problem in mathematical form and defines the

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terminology used in the remainder of the book. Chapter 2 is concerned with single variable optimization. The main algorithms of both search and approximation methods are developed in detail since they are an essential part of many multi-

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variable methods.

From cell phones to Web portals, advances in information and communications technology have thrust society into an information age that is far-reaching, fast-moving, increasingly complex, and

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yet essential to modern life. Now, renowned scholar and author David Luenberger has produced *Information Science*, a text that distills and explains the most important concepts and insights at the core of this ongoing revolution.

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The book represents the material used in a widely acclaimed course offered at Stanford University. Drawing concepts from each of the constituent subfields that collectively comprise information science, Luenberger builds his

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book around the five "E's" of information: Entropy, Economics, Encryption, Extraction, and Emission. Each area directly impacts modern information products, services, and technology--everything from word

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processors to digital cash, database systems to decision making, marketing strategy to spread spectrum communication. To study these principles is to learn how English text, music, and pictures can be compressed, how it is

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possible to construct a digital signature that cannot simply be copied, how beautiful photographs can be sent from distant planets with a tiny battery, how communication networks expand, and how producers of information

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products can make a profit under difficult market conditions. The book contains vivid examples, illustrations, exercises, and points of historic interest, all of which bring to life the analytic methods presented: Presents a unified

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approach to the field of information science Emphasizes basic principles Includes a wide range of examples and applications Helps students develop important new skills Suggests exercises with solutions in an instructor's manual

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Multiplicative noise appears in systems where the process or measurement noise levels depend on the system state vector. Such systems are relevant, for example, in radar measurements where larger ranges involve higher noise

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level. This monograph embodies a comprehensive survey of the relevant literature with basic problems being formulated and solved by applying various techniques including game theory, linear matrix inequalities and

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Lyapunov parameter-dependent functions. Topics covered include: convex H_2 and H_∞ norms analysis of systems with multiplicative noise; state feedback control and state estimation of systems with multiplicative noise;

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dynamic and static output feedback of stochastic bilinear systems; tracking controllers for stochastic bilinear systems utilizing preview information. Various examples which demonstrate the applicability of the theory to practical control

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engineering problems are considered; two such examples are taken from the aerospace and guidance control areas.

Optimization in Electrical
Engineering

Power Grid Operation in a Market

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Environment

LQ Dynamic Optimization and
Differential Games

Asynchronous Control for
Networked Systems

Information Science

Geophysical Inverse Theory

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As long as a branch of knowledge offers an abundance of problems, it is full of vitality. David Hilbert Over the last 15 years I have given lectures on a variety of problems in

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***nonlinear functional
analysis and its
applications. In doing this, I
have recommended to my
students a number of
excellent monographs
devoted to specialized***

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topics, but there was no complete survey-type exposition of nonlinear functional analysis making available a quick survey to the wide range of readers including mathematicians,

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natural scientists, and engineers who have only an elementary knowledge of linear functional analysis. I have tried to close this gap with my five-part lecture notes, the first three parts

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***of which have been published in the Teubner-
Texte series by Teubner-
Verlag, Leipzig, 1976, 1977,
and 1978. The present
English edition was
translated from a***

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completely rewritten manuscript which is significantly longer than the original version in the Teubner-Texte series. The material is organized in the following way: Part I: Fixed

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***Point Theorems. Part II:
Monotone Operators. Part
III: Variational Methods
and Optimization. Parts IV
jV: Applications to
Mathematical Physics. The
exposition is guided by the***

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***following considerations:
(a) What are the supporting basic ideas and what intrinsic interrelations exist between them? (/3) In what relation do the basic ideas stand to the known***

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***propositions of classical
analysis and linear
functional analysis? (y)
What typical applications
are there? VII Preface viii
Special emphasis is placed
on motivation.***

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Observer Design for Nonlinear Systems deals with the design of observers for the large class of nonlinear continuous-time models. It contains a unified overview of a broad

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range of general designs, including the most recent results and their proofs, such as the homogeneous and nonlinear Luenberger design techniques. The book starts from the

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***observation that most
observer designs consist in
looking for a reversible
change of coordinates
transforming the
expression of the system
dynamics into some specific***

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structures, called normal forms, for which an observer is known. Therefore, the problem of observer design is broken down into three sub-problems: • What are the

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available normal forms and their associated observers? • Under which conditions can a system be transformed into one of these forms and through which transformation? •

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How can an inverse transformation that recovers an estimate in the given initial coordinates be achieved? This organisation allows the book to structure results within a united

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framework, highlighting the importance of the choice of the observer coordinates for nonlinear systems. In particular, the first part covers state-affine forms with their Luenberger or

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Kalman designs, and triangular forms with their homogeneous high-gain designs. The second part addresses the transformation into linear forms through linearization

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by output injection or in the context of a nonlinear Luenberger design, and into triangular forms under the well-known uniform and differential observability assumptions. Finally, the

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third part presents some recently developed methods for avoiding the numerically challenging inversion of the transformation. Observer Design for Nonlinear

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Systems addresses students and researchers looking for an introduction to or an overview of the state of the art in observer design for nonlinear continuous-time dynamical systems. The

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book gathers the most important results focusing on a large and diffuse literature on general observer designs with global convergence, and is a valuable source of

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***information for academics
and practitioners.***

***H-infinity Control and
Estimation of State-
multiplicative Linear
Systems Springer Science &
Business Media***

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This book offers a unique compendium of the authors' own research on the use of theoretical stability analysis, showing how to take advantage of local stability design and

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ultimate boundedness for practical robot control. It addresses researchers and postgraduate students dealing with control theory, particularly with nonlinear systems. Thanks to the

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***numerous worked
examples, it could also be
used as a textbook in
postgraduate courses.
Optimization by Vector
Space Methods
Energy Research Abstracts***

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***Analysis and Design of
Descriptor Linear Systems
Introduction to
Optimization Methods
Observer Design for
Nonlinear Systems
An Example of the***

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***Development and
Application of Some
Modern Control Techniques
to Industrial Processes
Game theory is the theory of
social situations, and the
majority of research into the***

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topic focuses on how groups of people interact by developing formulas and algorithms to identify optimal strategies and to predict the outcome of interactions. Only fifty years old, it has already revolutionized economics and

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finance, and is spreading rapidly to a wide variety of fields. LQ Dynamic Optimization and Differential Games is an assessment of the state of the art in its field and the first modern book on linear-quadratic game theory,

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one of the most commonly used tools for modelling and analysing strategic decision making problems in economics and management. Linear quadratic dynamic models have a long tradition in economics, operations

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research and control engineering; and the author begins by describing the one-decision maker LQ dynamic optimization problem before introducing LQ differential games. Covers cooperative and non-cooperative

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scenarios, and treats the standard information structures (open-loop and feedback). Includes real-life economic examples to illustrate theoretical concepts and results. Presents problem formulations and sound

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mathematical problem analysis. Includes exercises and solutions, enabling use for self-study or as a course text. Supported by a website featuring solutions to exercises, further examples and computer code for

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***numerical examples. LQ
Dynamic Optimization and
Differential Games offers a
comprehensive introduction
to the theory and practice of
this extensively used class of
economic models, and will
appeal to applied***

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mathematicians and econometricians as well as researchers and senior undergraduate/graduate students in economics, mathematics, engineering and management science. Engineers must make

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decisions regarding the distribution of expensive resources in a manner that will be economically beneficial. This problem can be realistically formulated and logically analyzed with optimization theory. This

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book shows engineers how to use optimization theory to solve complex problems. Unifies the large field of optimization with a few geometric principles. Covers functional analysis with a minimum of mathematics.

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Contains problems that relate to the applications in the book.

Bridging theory and practice, this book contains over 200 practical exercises and their solutions, to develop the problem-solving abilities of

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process engineers. The problems were developed by the author during his many years of teaching at university and are kept brief, taken from the fields of instrumentation, modelling, plant control, control strategy

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design and stability of control. The algorithm flows and codes, which are mostly based on MATLAB®, are given in many cases and allow for easy translation into applications. Since the text is structured according to

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"Applied Process Control: Essential Methods", all of the necessary background information on the underlying methods can be easily and quickly found in this accompanying book. This third edition of the

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classic textbook in Optimization has been fully revised and updated. It comprehensively covers modern theoretical insights in this crucial computing area, and will be required reading for analysts and operations

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researchers in a variety of fields. The book connects the purely analytical character of an optimization problem, and the behavior of algorithms used to solve it. Now, the third edition has been completely updated with

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recent Optimization Methods. The book also has a new co-author, Yinyu Ye of California's Stanford University, who has written lots of extra material including some on Interior Point Methods.

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Spatial Time Series

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Robust Control

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Positive Linear Systems

Introduction to Modern

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Economic Growth is a groundbreaking text from one of today's leading economists. Daron Acemoglu gives graduate students not only the tools to analyze growth

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and related macroeconomic problems, but also the broad perspective needed to apply those tools to the big-picture questions of growth and divergence.

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And he introduces the economic and mathematical foundations of modern growth theory and macroeconomics in a rigorous but easy to follow manner. After

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covering the necessary background on dynamic general equilibrium and dynamic optimization, the book presents the basic workhorse models of growth and takes

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students to the frontier areas of growth theory, including models of human capital, endogenous technological change, technology transfer, international

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trade, economic development, and political economy. The book integrates these theories with data and shows how theoretical approaches can lead to

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better perspectives on the fundamental causes of economic growth and the wealth of nations. Innovative and authoritative, this book is likely to shape how

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*economic growth is
taught and learned for
years to come.*

*Introduces all the
foundations for
understanding economic
growth and dynamic*

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macroeconomic analysis

Focuses on the big-

picture questions of

economic growth Provides

mathematical foundations

Presents dynamic general

equilibrium Covers

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*models such as basic
Solow, neoclassical
growth, and overlapping
generations, as well as
models of endogenous
technology and
international linkages*

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*Addresses frontier
research areas such as
international linkages,
international trade,
political economy, and
economic development and
structural change An*

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accompanying Student Solutions Manual containing the answers to selected exercises is available (978-0-691-14163-3/\$24.95). See: <http://press.princeton.edu/ti>

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The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector

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calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer

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science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine

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learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine

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learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a

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mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the

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methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test

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understanding.

Programming tutorials are offered on the book's web site.

A comprehensive introduction to the tools, techniques and

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*applications of convex
optimization.*

Aircraft Control

*Allocation Wayne Durham,
Virginia Polytechnic*

Institute and State

University, USA Kenneth

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A. Bordignon, Embry-Riddle Aeronautical University, USA Roger Beck, Dynamic Concepts, Inc., USA An authoritative work on aircraft control

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*allocation by its
pioneers Aircraft
Control Allocation
addresses the problem of
allocating supposed
redundant flight
controls. It provides*

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introductory material on flight dynamics and control to provide the context, and then describes in detail the geometry of the problem. The book includes a

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large section on solution methods, including 'Banks' method', a previously unpublished procedure. Generalized inverses are also discussed at

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length. There is an introductory section on linear programming solutions, as well as an extensive and comprehensive appendix dedicated to linear

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programming formulations and solutions. Discrete-time, or frame-wise allocation, is presented, including rate-limiting, nonlinear data, and preferred

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*solutions. Key features:
Written by pioneers in
the field of control
allocation.*

*Comprehensive
explanation and
discussion of the major*

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control allocation solution methods. Extensive treatment of linear programming solutions to control allocation. A companion web site contains the

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*code of a
MATLAB/Simulink flight
simulation with modules
that incorporate all of
the major solution
methods. Includes
examples based on actual*

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aircraft. The book is a vital reference for researchers and practitioners working in aircraft control, as well as graduate students in aerospace

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engineering.

Principles of

Mathematical Analysis

Linear and Nonlinear

Programming

a Design System for

Linear Multivariable

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*Control
Control Engineering
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and Control of the
Soaking Pit
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Descriptor linear systems theory is an important part in the general field of control systems theory, and has attracted much attention in the last two decades. In spite of the fact that descriptor linear systems theory has been a topic

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very rich in content, there have been only a few books on this topic. This book provides a systematic introduction to the theory of continuous-time descriptor linear systems and aims to provide a relatively

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systematic introduction to the basic results in descriptor linear systems theory. The clear representation of materials and a large number of examples make this book easy to understand by a large audience. General readers

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will find in this book a comprehensive introduction to the theory of descriptive linear systems. Researchers will find a comprehensive description of the most recent results in this theory and students will find a good

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introduction to some important problems in linear systems theory.
Robust Control Robust Control Youla Parameterization Approach
Discover efficient methods for designing robust control systems
In Robust Control: Youla

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Parameterization Approach, accomplished engineers Dr. Farhad Assadian and Kevin R. Mallon deliver an insightful treatment of robust control system design that does not require a theoretical background

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in controls. The authors connect classical control theory to modern control concepts using the Youla method and offer practical examples from the automotive industry for designing control systems with the Youla method.

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The book demonstrates that feedback control can be elegantly designed in the frequency domain using the Youla parameterization approach. It offers deep insights into the many practical applications from utilizing this

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technique in both Single Input Single Output (SISO) and Multiple Input Multiple Output (MIMO) design. Finally, the book provides an estimation technique using Youla parameterization and controller output observer for the

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first time. Robust Control offers readers: A thorough introduction to a review of the Laplace Transform, including singularity functions and transfer functions Comprehensive explorations of the response of linear, time-

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invariant, and dynamic systems, as well as feedback principles and feedback design for SISO
Practical discussions of norms and feedback systems, feedback design by the optimization of closed-loop norms, and estimation

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design for SISO using the parameterization approach In-depth examinations of MIMO control and multivariable transfer function properties Perfect for industrial researchers and engineers working with control

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systems, Robust Control: Youla Parameterization Approach is also an indispensable resource for graduate students in mechanical, aerospace, electrical, and chemical engineering.

This textbook aims to fill the gap

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between those that offer a theoretical treatment without many applications and those that present and apply formulas without appropriately deriving them. The balance achieved will give readers a fundamental

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understanding of key financial ideas and tools that form the basis for building realistic models, including those that may become proprietary. Numerous carefully chosen examples and exercises reinforce the student's conceptual

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understanding and facility with applications. The exercises are divided into conceptual, application-based, and theoretical problems, which probe the material deeper. The book is aimed toward advanced

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undergraduates and first-year graduate students who are new to finance or want a more rigorous treatment of the mathematical models used within. While no background in finance is assumed, prerequisite math courses include

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multivariable calculus, probability, and linear algebra. The authors introduce additional mathematical tools as needed. The entire textbook is appropriate for a single year-long course on introductory mathematical

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finance. The self-contained design of the text allows for instructor flexibility in topics courses and those focusing on financial derivatives. Moreover, the text is useful for mathematicians, physicists, and engineers who

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consumption. This textbook addresses this critical imperative integrating theory, modeling, the development of numerical methods, and problem solving, thus preparing the student to apply optimization to real-world

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problems. This text covers a broad variety of optimization problems using: unconstrained, constrained, gradient, and non-gradient techniques; duality concepts; multiobjective optimization; linear, integer, geometric, and

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dynamic programming with applications; and finite element-based optimization. It is ideal for advanced undergraduate or graduate courses and for practising engineers in all engineering disciplines, as well as

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This book is the result
of over ten (10) years
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robots and structures at Sandia National Laboratories. The authors decided to collect this wealth of knowledge into a set of viewgraphs in order to

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teach a graduate class in Flexible Robot Dynamics and Controls within the Mechanical Engineering Department at the University of New Mexico (UNM). These

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viewgraphs, encouragement from several students, and many late nights have produced a book that should provide an upper-level undergraduate and

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graduate textbook and a reference for experienced professionals. The content of this book spans several disciplines including

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structural dynamics,
system identification,
optimization, and
linear, digital, and
nonlinear control theory
which are developed from
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including electrical, mechanical, and aerospace engineering as well as engineering mechanics. As a result, the authors believe that this book demonstrates the value

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of solid applied theory when developing hardware solutions to real world problems. The reader will find many real world applications in this book and will be

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China has achieved rapid economic growth since the market-oriented reform in 1978 and became the second largest economy in the world in 2010. However,

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the growth model in China is still extensive in nature and may be characterized with high energy consumption and heavy environmental pollutions etc. In fact,

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China has successively become the largest carbon emitter since 2007 and the largest energy consumer since 2009 in the world. This book endeavors to

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analyze whether such energy driven and environment restricted economic growth can be sustainable in China in the long run. The book describes the basic

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situations of energy consumption and environmental pollution in China from the dimensions of industries, regions and energy-types. It also

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externalities of pollutants and estimates the environmental total factor productivity accurately. The possibilities of win-win development and double

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is divided into three main parts: The first part contains the definitions and basic properties of positive linear systems. The second part, following

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theoretical exposition,
reports the main
conceptual results,
considering applicable
examples taken from a
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models. The third part is devoted to the study of some classes of positive linear systems of particular relevance in applications (such as the Leontief model, the

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algebra and linear
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Step-by-step explanations of the

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algorithms and examples
Includes MATLAB-based
solution software
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Energy, Environment and
Economic Transformation
in China
Theory and Applications
Applied and
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Signals, and Circuits

**This book collects
together in one volume a
number of suggested
control engineering
solutions which are
intended to be**

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**representative of
solutions applicable to
a broad class of control
problems. It is neither
a control theory book
nor a handbook of
laboratory experiments,**

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**but it does include both
the basic theory of
control and associated
practical laboratory set-
ups to illustrate the
solutions proposed.
A new breed of engineer**

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is developing in our contemporary society. These engineers are concerned with communications and computers, economics and regulation. These new

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engineers apply themselves to data-to its packaging, transmission, and protection. They are data engineers. Formal curricula do not yet

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**exist for their
dedicated development.
Rather they learn most
of their tools "on the
job" and their roots are
in computer engineering,
communications**

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engineering, and applied mathematics. There is a need to draw relevant material together and present it so that those who wish to become data engineers can do so, for

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**the betterment of
themselves, their
employer, their country,
and, ultimately, the
world-for we share the
belief that the most
effective tool for world**

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**peace and stability is
neither politics nor
armaments, but rather
the open and timely
exchange of information.
This book has been
written with that goal**

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in mind. Today numerous signs encourage us to expect broader information exchange in the years to come. The movement toward a true Integrated Services

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Digital Network (ISDN)
is perhaps the clearest
of these. Also, the
development of formal
protocol layers reflects
both a great deal of
brilliance and

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**compromise and also the
desire for a common
language among data
engineers.**

**Financial intermediaries
typically offer
derivatives to their**

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customers only when they can hedge the exposures from these transactions. Baron and Lange show that parimutuel auctions can be used by financial intermediaries to offer

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designing linear
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time-variant
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