Differential Equations 47th Edition

Through the past 20 years, the framework of Linear Parameter-Varying (LPV) systems has become a promising system theoretical approach to handle the control of mildly nonlinear and especially position dependent systems which are common in mechatronic applications and in the process industry. The birth of this system class was initiated by the need of engineers to achieve better performance for nonlinear and time-varying dynamics, c- mon in many industrial applications, than what the classical framework of Linear Time-Invariant (LTI) control can provide. However, it was also a p- mary goal to preserve simplicity and “re-use” the powerful LTI results by extending them to the LPV case. The progress continued according to this philosophy and LPV control has become a well established ?eld with many promising applications. Unfortunately, modeling of LPV systems, especially based on measured data (which is called system identi?cation) has seen a limited development sincethebirthoftheframework. Currentlythisbottleneck oftheLPVfra- work is halting the transfer of the LPV theory into industrial use. Without good models that ful?ll the expectations of the users and without the und- standing how these models correspond to the dynamics of the application, it is di?cult to design high performance LPV control solutions. This book aims to bridge the gap between modeling and control by investigating the fundamental questions of LPV modeling and identi?cation. It explores the missing details of the LPV system theory that have hindered the formu- tion of a well established identi?cation framework.

Pure and Applied Mathematics, Volume 56: Partial Differential Equations of Mathematical Physics provides a collection of lectures related to the partial differentiation of mathematical physics. This book covers a variety of topics, including waves, heat conduction, hydrodynamics, and other physical problems. Comprised of 30 lectures, this book begins with an overview of the theory of the equations of mathematical physics that has its object the study of the integral, differential, and functional equations describing various natural phenomena. This text then examines the linear equations of the second order with real coefficients. Other lectures consider the Lebesgue–Fubini theorem on the possibility of changing the order of integration in a multiple integral. This book discusses as well the Dirichlet problem and the Neumann problem for domains other than a sphere or half-space. The final lecture deals with the properties of spherical functions. This book is a valuable resource for mathematicians.

• The book 35 JEE Main Physics, Chemistry & Mathematics Online & Offline Topic-wise Solved Papers provides the last 16 years ONLINE & OFFLINE 2002-17 papers. • The book contains a total of 35 papers - 17 papers of AIEEE/ JEE Main from the year 2002 - 2017 held OFFLINE including the AIEEE 2011 RESCHEDULED paper and 18 JEE Main papers held ONLINE from 2012-17. • The books are distributed into around 28,31 & 27 topics in Physics, Chemistry & Mathematics respectively exactly following the chapter sequence of the NCERT

books of class 11 and 12. • The questions in each topic are immediately followed by their detailed solutions. The book constitutes around 4100 most important MCQs.

Non-Linear Differential EquationsInternational Series of Monographs in Pure and Applied MathematicsElsevier

This book covers tutorial and research contributions on the use of dynamical systems and stochastic models in disease dynamics. Beginning graduate students in applied mathematics, scientists, or mathematicians who want to enter the fields of mathematical and theoretical epidemiology will find this book useful.

This volume brings together a comprehensive selection of over fifty reprints on the theory and applications of chaotic oscillators. Included are fundamental mathematical papers describing methods for the investigation of chaotic behavior in oscillatory systems as well as the most important applications in physics and engineering. There is currently no book similar to this collection.

Classic monograph presents connected account of mathematical theory of wave motion in a liquid with a free surface and subjected to gravitational and other forces, together with applications to concrete physical problems. 1957 edition.

The present volume comprises survey articles on various fields of Differential-Algebraic Equations (DAEs), which have widespread applications in controlled dynamical systems, especially in mechanical and electrical engineering and a strong relation to (ordinary) differential equations. The individual chapters provide reviews, presentations of the current state of research and new concepts in - Observers for DAEs - DAEs in chemical processes - Optimal control of DAEs - DAEs from a functional-analytic viewpoint - Algebraic methods for DAEs The results are presented in an accessible style, making this book suitable not only for active researchers but also for graduate students (with a good knowledge of the basic principles of DAEs) for self-study.

Cyber-physical systems (CPS) involve deeply integrated, tightly coupled computational and physical components. These systems, spanning multiple scientific and technological domains, are highly complex and pose several fundamental challenges. They are also critically important to society’s advancement and security. The design and deployment of the adaptable, reliable CPS of tomorrow requires the development of a basic science foundation, synergistically drawing on various branches of engineering, mathematics, computer science, and domain specific knowledge. This book brings together 19 invited papers presented at the Workshop on Control of Cyber-Physical Systems, hosted by the Department of Electrical & Computer Engineering at The Johns Hopkins University in March 2013. It highlights the central role of control theory and systems thinking in developing the theory of CPS, in addressing the challenges of cyber-trust and cyber-security, and in advancing emerging cyber-physical applications ranging from smart grids to smart buildings, cars and robotic systems.

1. The book ‘MCA Entrances Solved Papers’ is a complete practice package 2.

Carries last 9 years questions to get acquainted with the paper pattern 3. Various other institutes papers are also given 4. Well detailed answers are given for every question Presenting the completely revised edition of “MCA Entrances Solved Papers 2020-2011” – which is designed to provide the most updated practice material that helps you to get through MCA Entrances. As the name of the title suggests, this book has last 10 previous years’ solved papers from 2020-2011 along with fully explained solutions giving insight of pattern, type and level of questions asked in the exams that will help aspirants to regenerate their knowledge in a single shot. This result-oriented practice book will enhance the understanding level by promoting wide range of questions of different levels in this single book. Ultimately, it will make you able to qualify your upcoming MCA Entrance. TOC NIMCET MCA Solved paper 2020, BHU MCA Solved Paper 2020, NIMCET MCA Solved Paper [2019-2011], IIT JAM MCA Solved Paper 2012 & Solved Paper 2010, JNU MCA Solved Paper 2019-2013, PUNE MCA Solved Paper 2017 & 2015, BHU MCA Solved Paper [2019-2011], KIITEE MCA Solved Paper 2012 & 2011, Other Regional MCA Entrances: MP MCA Solved Paper 2014, HCU MCA Solved Paper Solved Paper 2015 & 2013, AMU MCA Solved paper 2011

The third edition of Transport Phenomena Fundamentals continues with its streamlined approach to the subject of transport phenomena, based on a unified treatment of heat, mass, and momentum transport using a balance equation approach. The new edition makes more use of modern tools for working problems, such as COMSOL®, Maple®, and MATLAB®. It introduces new problems at the end of each chapter and sorts them by topic for ease of use. It also presents new concepts to expand the utility of the text beyond chemical engineering. The text is divided into two parts, which can be used for teaching a two-term course. Part I covers the balance equation in the context of diffusive transport—momentum, energy, mass, and charge. Each chapter adds a term to the balance equation, highlighting that term's effects on the physical behavior of the system and the underlying mathematical description. Chapters familiarize students with modeling and developing mathematical expressions based on the analysis of a control volume, the derivation of the governing differential equations, and the solution to those equations with appropriate boundary conditions. Part II builds on the diffusive transport balance equation by introducing convective transport terms, focusing on partial, rather than ordinary, differential equations. The text describes paring down the microscopic equations to simplify the models and solve problems, and it introduces macroscopic versions of the balance equations for when the microscopic approach fails or is too cumbersome. The text discusses the momentum, Bournoulli, energy, and species continuity equations, including a brief description of how these equations are applied to heat exchangers, continuous contactors, and chemical reactors. The book also introduces the three fundamental transport coefficients: the friction factor, the heat transfer coefficient, and the mass transfer coefficient in the

context of boundary layer theory. The final chapter covers the basics of radiative heat transfer, including concepts such as blackbodies, graybodies, radiation shields, and enclosures. The third edition incorporates many changes to the material and includes updated discussions and examples and more than 70 new homework problems.

This is a book of a series on interdisciplinary topics on the Biological and Mathematical Sciences. The chapters correspond to selected papers on special research themes, which have been presented at BIOMAT 2013 International Symposium on Mathematical and Computational Biology which was held in the Fields Institute for Research in Mathematical Sciences, Toronto, Ontario, Canada, on November 04 – 08, 2013. The treatment is both pedagogical and advanced in order to motivate research students as well as to fulfill the requirements of professional practitioners. There are comprehensive reviews written by prominent scientific leaders of famous research groups.

Contents:Population Dynamics:The Princess and the Pea: The Unexpected Importance of Movement Algorithms (Rebecca Tyson)Plankton Nutrient Interaction Model with Harvesting under Constant Environment (Samares Pal and A Chatterjee)Traveling Wave Solutions for a Chemotaxis System (F Catrina and V M Reyes G)Dynamics of a General Stage Structured N Parallel Food Chains (Isam Al-Darabsah and Yuan Yuan)Pattern Recognition of Biological Phenomena:Complex Data Clustering: From Neural Network Architecture to Theory and Applications of Nonlinear Dynamics of Pattern Recognition (Guojun Gan, Jialun Yin, Yulia Wang and Jianhong Wu)Dynamic and Geometric Modelling of Biomolecular Structures:A Two-Step Kinetic Model of Insulin Aggregation with a Competitive Inhibitor (Mark Whidden, Allison Ho and Santiago Schnell)Optimal Control Techniques in Mathematical Modelling of Biological Phenomena:Optimal Control of Resource Coefficient in a Parabolic Population Model (J Bintz, H Finotti and S Lenhart)Optimization of Costs for Combating Aedes Aegypti in Optimal Time-Windows (W O Dias, G A Xavier, D A P Lima, E F Wanner and R T N Cardoso)Dynamics of a Varroa-Infested Honey Bee Colonies Model (K O Okosun)Computational Biology:Probability Distributions of GC Content Reflect the Evolution of Primate Species (Marco V José, Qi Lu and Juan R Bobadilla)Mining the Constraints of Protein Evolution (Fernando Encinas and Antonio Basilio de Miranda)Entropy Measures Based Methods for the Classification of Protein Domains into Families and Clans (Nicolas Carels, Cecilia F Mondaini and Rubem P Mondaini)Modelling Physiological Disorders:Modelling of Porous Elastic and Viscoelastic Media and Its Application to the Brain (R Begg, J Murley, M. Kohandel and S Sivaloganathan)The Mathematics of Liver Transplantation (F A B Coutinho, E Chaib, M Amaku, M M Burattini and E Massad)Complexity of Molecular Signaling Networks for Various Types of Cancer and Neurological Diseases Correlates with Patient Survivability (D Breitkreutz, E A Rietman, P Hinow, M Healey and J A Tuszynski)Mathematical Modelling of Infectious Diseases:Modelling Malaria Dynamics in Temperate

Regions with Long Term Incubation Period (Kyeongah Nah, Gergely Röst and Yongkuk Kim)A Simulation of the U S Influenza Outbreak in 2009–2010 Using a Patch SIR Model based on Airport Transportation Data (D L Wallace and M Chen)Modelling Directly Transmitted Infections considering Age-structured Contact Rate and Vaccination (H M Yang and C H Dezotti)A General Framework for Agent-Based Modelling with Applications to Infectious Disease Dynamics (Marek Laskowski and Seyed M Moghadas)Analysis of the Basic Reproduction Number from the Initial Growth Phase of the Outbreak in Diseases Caused by Vectors (R P Sanches and E Massad)Parameter Estimation of a Tuberculosis Model in a Patchy Environment: Case of Cameroon (D P Moualeu, S Bowong and J Kürts)An Agent-Based Modelling Framework for Tuberculosis Infection with Drug-Resistance (Aquino L Espindola, A S Martinez and Seyed M Moghadas)Some Extensions of the Classical Epidemic Models (Fred Brauer) Readership: Undergraduates, graduates, researchers and all practitioners on the interdisciplinary fields of Mathematical Biology, Biological Physics and Mathematical Modelling of Biosystems. Keywords:Mathematical Biology;Biomathematics;Mathematical Modelling of Biosystems;Biological Physics;Biophysics;Computational Biology;Bioinformatics

Algorithms and Theory of Computation Handbook, Second Edition: Special Topics and Techniques provides an up-to-date compendium of fundamental computer science topics and techniques. It also illustrates how the topics and techniques come together to deliver efficient solutions to important practical problems. Along with updating and revising many of the existing chapters, this second edition contains more than 15 new chapters. This edition now covers self-stabilizing and pricing algorithms as well as the theories of privacy and anonymity, databases, computational games, and communication networks. It also discusses computational topology, natural language processing, and grid computing and explores applications in intensity-modulated radiation therapy, voting, DNA research, systems biology, and financial derivatives. This best-selling handbook continues to help computer professionals and engineers find significant information on various algorithmic topics. The expert contributors clearly define the terminology, present basic results and techniques, and offer a number of current references to the in-depth literature. They also provide a glimpse of the major research issues concerning the relevant topics.

The book covers the latest theoretical results and sophisticated applications in the field of variable-structure systems and sliding-mode control. This book is divided into four parts. Part I discusses new higher-order sliding-mode algorithms, including new homogeneous controllers and differentiators. Part II then explores properties of continuous sliding-mode algorithms, such as saturated feedback control, reaching time, and orbital stability. Part III is focused on the usage of variable-structure systems (VSS) controllers for solving other control problems, for example unmatched disturbances. Finally, Part IV discusses applications of VSS; these include applications within power electronics and vehicle platooning. Variable-structure Systems and Sliding-Mode Control will be of interest to academic researchers, students and practising engineers.

Covering a range of subjects from operator theory and classical harmonic analysis to Banach space theory, this book contains survey and expository articles by leading

experts in their corresponding fields, and features fully-refereed, high-quality papers exploring new results and trends in spectral theory, mathematical physics, geometric function theory, and partial differential equations. Graduate students and researchers in analysis will find inspiration in the articles collected in this volume, which emphasize the remarkable connections between harmonic analysis and operator theory. Another shared research interest of the contributors of this volume lies in the area of applied harmonic analysis, where a new notion called chromatic derivatives has recently been introduced in communication engineering. The material for this volume is based on the 13th New Mexico Analysis Seminar held at the University of New Mexico, April 3-4, 2014 and on several special sections of the Western Spring Sectional Meeting at the University of New Mexico, April 4-6, 2014. During the event, participants honored the memory of Cora Sadosky—a great mathematician who recently passed away and who made significant contributions to the field of harmonic analysis. Cora was an exceptional mathematician and human being. She was a world expert in harmonic analysis and operator theory, publishing over fifty-five research papers and authoring a major textbook in the field. Participants of the conference include new and senior researchers, recent doctorates as well as leading experts in the area.

Vols. 1-14,16- include the society's Proceedings,1871-1905,1961- .

International Series of Monographs in Pure and Applied Mathematics, Volume 67: Non-Linear Differential Equations, Revised Edition focuses on the analysis of the phase portrait of two-dimensional autonomous systems; qualitative methods used in finding periodic solutions in periodic systems; and study of asymptotic properties. The book first discusses general theorems about solutions of differential systems. Periodic solutions, autonomous systems, and integral curves are explained. The text explains the singularities of Briot-Bouquet theory. The selection takes a look at plane autonomous systems. Topics include limiting sets, plane cycles, isolated singular points, index, and the torus as phase space. The text also examines autonomous plane systems with perturbations and autonomous and non-autonomous systems with one degree of freedom. The book also tackles linear systems. Reducible systems, periodic solutions, and linear periodic systems are considered. The book is a vital source of information for readers interested in applied mathematics.

This book features a selection of high-quality papers chosen from the best presentations at the International Conference on Spectral and High-Order Methods (2016), offering an overview of the depth and breadth of the activities within this important research area. The carefully reviewed papers provide a snapshot of the state of the art, while the extensive bibliography helps initiate new research directions.

The need for a rigorous mathematical theory for Differential-Algebraic Equations (DAEs) has its roots in the widespread applications of controlled dynamical systems, especially in mechanical and electrical engineering. Due to the strong relation to (ordinary) differential equations, the literature for DAEs mainly started out from introductory textbooks. As such, the present monograph is new in the sense that it comprises survey articles on various fields of DAEs, providing reviews, presentations of the current state of research and new concepts in - Controllability for linear DAEs - Port-Hamiltonian differential-algebraic systems - Robustness of DAEs - Solution concepts for DAEs - DAEs in circuit modeling. The results in the individual chapters are presented in an accessible style, making this book suitable not only for active researchers but also for graduate students (with a good knowledge of the basic principles of DAEs) for self-study.

"Presents the fundamentals of momentum, heat, and mass transfer from both a microscopic and a macroscopic perspective. Features a large number of idealized and real-world examples that we worked out in detail."

One of the major contemporary challenges in both physical and social sciences is modeling, analyzing, and understanding the self-organization, evolution, behavior, and eventual decay of complex dynamical systems ranging from cell assemblies to the human brain to animal societies. The multi-faceted problems in this domain require a wide range of methods from various scienti?c disciplines. There is no question that the inclusion of time delays in complex system models considerably enriches the challenges presented by the problems. Although this inclusion often becomes inevitable as real-world applications demand more and more realistic m- els, the role of time delays in the context of complex systems so far has not attracted the interest it deserves. The present volume is an attempt toward ?lling this gap. There exist various useful tools for the study of complex time-delay systems. At the forefront is the mathematical theory of delay equations, a relatively mature ?eld in many aspects, which provides some powerful techniques for analytical inquiries, along with some other tools from statistical physics, graph theory, computer science, dynamical systems theory, probability theory, simulation and optimization software, and so on. Nevertheless, the use of these methods requires a certain synergy to address complex systems problems, especially in the presence of time delays.

Textbook with a unique approach that integrates analysis and numerical methods and includes modelling to address real-life problems.

This book shares key insights into system performance and management analytics, demonstrating how the field of analytics is currently changing and how it is used to monitor companies' efforts to drive performance.Managing business performance facilitates the effective accomplishment of strategic and operational goals, and there is a clear and direct correlation between using performance management applications and improved business and organizational results. As such, performance and management analytics can yield a range of direct and indirect benefits, boost operational efficiency and unlock employees' latent potential, while at the same time aligning services with overarching goals.The book addresses a range of topics, including software reliability assessment, testing, quality management, system-performance management, analysis using soft-computing techniques, and management analytics. It presents a balanced, holistic approach to viewing the world from both a technical and managerial perspective by considering performance and management analytics. Accordingly, it offers a comprehensive guide to one of the most pressing issues in today's technology-dominated world, namely, that most companies and organizations find themselves awash in a sea of data, but lack the human capital, appropriate tools and knowledge to use it to help them create a competitive edge.

The book contains a selection of high quality papers, chosen among the best presentations during the International Conference on Spectral and High-Order Methods (2009), and provides an overview of the depth and breadth of the activities within this important research area. The carefully reviewed selection of the papers will provide the reader with a snapshot of state-of-the-art and help initiate new research directions through the extensive bibliography.

Popular Science gives our readers the information and tools to improve their technology and their world. The core belief that Popular Science and our readers share: The future is going to be better, and science and technology are the driving forces that will help make it better.

This book covers cutting-edge findings related to uncertainty quantification and optimization under uncertainties (i.e. robust and reliable optimization), with a special emphasis on aeronautics and turbomachinery, although not limited to

these fields. It describes new methods for uncertainty quantification, such as non-intrusive polynomial chaos, collocation methods, perturbation methods, as well as adjoint based and multi-level Monte Carlo methods. It includes methods for characterization of most influential uncertainties, as well as formulations for robust and reliable design optimization. A distinctive element of the book is the unique collection of test cases with prescribed uncertainties, which are representative of the current engineering practice of the industrial consortium partners involved in UMRIDA, a level 1 collaborative project within the European Commission's Seventh Framework Programme (FP7). All developed methods are benchmarked against these industrial challenges. Moreover, the book includes a section dedicated to Best Practice Guidelines for uncertainty quantification and robust design optimization, summarizing the findings obtained by the consortium members within the UMRIDA project. All in all, the book offers a authoritative guide to cutting-edge methodologies for uncertainty management in engineering design, covers a wide range of applications and discusses new ideas for future research and interdisciplinary collaborations.

Differential Equations in Engineering: Research and Applications describes advanced research in the field of the applications of differential equations in engineering and the sciences, and offers a sound theoretical background, along with case studies. It describes the advances in differential equations in real life for engineers. Along with covering many advanced differential equations and explaining the utility of these equations, the book provides a broad understanding of the use of differential equations to solve and analyze many real-world problems, such as calculating the movement or flow of electricity, the motion of an object to and from, like a pendulum, or explaining thermodynamics concepts by making use of various mathematical tools, techniques, strategies, and methods in applied engineering. This book is written for researchers and academicians, as well as for undergraduate and postgraduate students of engineering.

This expanded and revised second edition is a comprehensive and systematic treatment of linear and nonlinear partial differential equations and their varied applications. Building upon the successful material of the first book, this edition contains updated modern examples and applications from diverse fields. Methods and properties of solutions, along with their physical significance, help make the book more useful for a diverse readership. The book is an exceptionally complete text/reference for graduates, researchers, and professionals in mathematics, physics, and engineering.

The second part of 'Statistical Physics' deals with the quantum theory of the condensed state of matter. This volume is essentially an entirely new book, based on the large amount of new material which has become available in statistical physics since' Part 1' was published.

This book gathers papers from the International Conference on Differential & Difference Equations and Applications 2017 (ICDDEA 2017), held in Lisbon,

Portugal on June 5-9, 2017. The editors have compiled the strongest research presented at the conference, providing readers with valuable insights into new trends in the field, as well as applications and high-level survey results. The goal of the ICDDEA was to promote fruitful collaborations between researchers in the fields of differential and difference equations. All areas of differential and difference equations are represented, with a special emphasis on applications.