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Modeling, Estimation, and Their Applications for Distributed Parameter Systems - Yoshikazu Sawaragi 1978

Computational Mechanics '95 - S.N. Atluri 2013-11-11
AI!, in the earlier conferences (Tokyo, 1986; Atlanta, 1988, Melbourne, 1991; and Hong Kong, 1992) the response to the call for presentations at ICES-95 in Hawaii has been overwhelming. A very careful screening of the extended abstracts resulted in about 500 paper being accepted for presentation. Out of these, written versions of about 480 papers reached the conference secretariat in Atlanta in time for inclusion in these proceedings. The topics covered at ICES-95 range over the broadest spectrum of computational engineering science. The editors thank the international scientific committee, for their advice and encouragement in making ICES-95 a successful scientific event. Special thanks are expressed to the International Association for Boundary Elements Methods for hosting IABEM-95 in conjunction with ICES-95. The editors here express their deepest gratitude to Ms. Stacy Morgan for her careful handling of a myriad of details of ICES-95, often times under severe time constraints. The editors hope that the readers of this proceedings will find a kaleidoscopic view of computational engineering in the year 1995, as practiced in various parts of the world. Satya N. Atluri Atlanta, Georgia, USA Genki Yagawa Tokyo,Japan Thomas A. Cruse Nashville, TN, USA Organizing Committee Professor Genki Yagawa, University of Tokyo, Japan, Chair Professor Satya Atluri, Georgia Institute of Technology, U.S.A.

Spatio-Temporal Modeling of Nonlinear Distributed Parameter Systems - Han-Xiong Li 2011-02-24
The purpose of this volume is to provide a brief review of the previous work on model reduction and identifi cation of distributed parameter systems (DPS), and develop new spatio-temporal models and their relevant identifi cation approaches. In this book, a systematic overview and classifi cation on the modeling of DPS is presented fi rst, which includes model reduction, parameter estimation and system identifi cation. Next, a class of block-oriented nonlinear systems in traditional lumped parameter systems (LPS) is extended to DPS, which results in the spatio-temporal Wiener and Hammerstein systems and their identifi cation methods. Then, the traditional Volterra model is extended to DPS, which results in the spatio-temporal Volterra model and its identification algorithm. All these methods are based on linear time/space separation. Sometimes, the nonlinear time/space separation can play a better role in modeling of very complex processes. Thus, a nonlinear time/space separation based neural modeling is also presented for a class of DPS with more complicated dynamics. Finally, all these modeling approaches are successfully applied to industrial thermal processes, including a catalytic rod, a packed-bed reactor and a snap curing oven. The work is presented giving a unifi ed view from time/space separation. The book also illustrates applications to thermal processes in the electronics packaging and chemical industry. This volume assumes a basic knowledge about distributed parameter systems, system modeling and identifi cation. It is intended for researchers, graduate students and engineers interested in distributed parameter systems, nonlinear systems, and process modeling and control.

Control and Estimation of Distributed Parameter Systems - Wolfgang Desch 2003
Consisting of 16 refereed original contributions, this volume presents a diversified collection of recent results in control of distributed parameter systems. Topics addressed include - optimal control in fluid mechanics - numerical methods for optimal control of partial differential equations - modeling and control of shells - level set methods - mesh adaptation for parameter estimation problems - shape optimization Advanced graduate students and researchers will find the book an excellent guide to the forefront of control and estimation of distributed parameter systems.

Topics in Identification and Distributed Parameter Systems - Erhard Bühler 2013-07-02

Estimation and Control of Distributed Parameter Systems - Wolfgang Desch 1991

Control and Estimation of Dynamical Nonlinear and Partial Differential Equation Systems - Gerasimos Rigatos 2022-06-21
In this comprehensive reference, the authors present new and innovative control and estimation methods based on dynamical nonlinear and partial differential equation systems, which are used in solving control problems such as stability and robustness issues in robotics, mechatronics, and other engineering applications.

Control Systems, Robotics and AutomatioN – Volume XVI - Heinz D. Unbehauen 2009-10-11
This Encyclopedia of Control Systems, Robotics, and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS, which is an integrated compendium of twenty one Encyclopedias. This 22-volume set contains 240 chapters, each of size 5000-30000 words, with perspectives, applications and extensive illustrations. It is the only publication of its kind carrying state-of-the-art knowledge in the fields of Control Systems, Robotics, and Automation and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Optimal Sensor Networks Scheduling in Identification of Distributed Parameter Systems - Maciej Patan 2012-02-23
Sensor networks have recently come into prominence because they hold the potential to revolutionize a wide spectrum of both civilian and military applications. An ingenious characteristic of sensor networks is the distributed nature of data acquisition. Therefore they seem to be ideally prepared for the task of monitoring processes with spatio-temporal dynamics which constitute one of most general and important classes of systems in modelling of the real-world phenomena. It is clear that careful deployment and activation of sensor nodes are critical for collecting the most valuable information from the observed environment. Optimal Sensor Network Scheduling in Identification of Distributed Parameter Systems discusses the characteristic features of the sensor scheduling problem, analyzes classical and recent approaches, and proposes a wide range of original solutions, especially dedicated for networks with mobile and scanning nodes. Both researchers and practitioners will find the case studies, the proposed algorithms, and the numerical examples to be invaluable.

Control and Estimation of Distributed Parameter Systems - W. Desch 1998-03-24

Consisting of 23 refereed contributions, this volume offers a broad and diverse view of current research in control and estimation of partial differential equations. Topics addressed include, but are not limited to - control and stability of hyperbolic systems related to elasticity, linear and nonlinear; - control and identification of nonlinear parabolic systems; - exact and approximate controllability, and observability; - Pontryagin's maximum principle and dynamic programming in PDE; and - numerics pertinent to optimal and suboptimal control problems. This volume is primarily geared toward control theorists seeking information on the latest developments in their area of expertise. It may also serve as a stimulating reader to any researcher who wants to gain an impression of activities at the forefront of a vigorously expanding area in applied mathematics.

Control and Estimation in Distributed Parameter Systems - H. T. Banks 1992-01-01

A comprehensive and lucid text that relates frequency domain techniques to state-space or time domain approaches for infinite-dimensional systems.

Estimation Techniques for Distributed Parameter Systems - H.T. Banks 2011-09-15

The research detailed in this monograph was originally motivated by our interest in control problems involving partial and delay differential equations. Our attempts to apply control theory techniques to such prob lems in several areas of science convinced us that in the need for better and more detailed models of distributed/ continuum processes in biology and mechanics lay a rich, interesting, and challenging class of fundamen tal questions. These questions, which involve science and mathematics, are typical of those arising in inverse or parameter estimation problems. Our efforts on inverse problems for distributed parameter systems, which are infinite dimensional in the most common realizations, began about seven years ago at a time when rapid advances in computing capabilities and availability held promise for significant progress in the development of a practically useful as well as theoretically sound methodology for such problems. Much of the research reported in our presentation was not begun when we outlined the plans for this monograph some years ago. By publishing this monograph now, when only a part of the originally intended topics are covered (see Chapter VII in this respect), we hope to stimulate the research and interest of others in an area of scientific en deavor which has exceeded even our optimistic expectations with respect to excitement, opportunity, and stimulation. The computer revolution alluded to above and the development of new codes allow one to solve rather routinely certain estimation problems that would have been out of the question ten years ago.

Optimal Mobile Sensing and Actuation Policies in Cyber-physical Systems - Christophe Tricaud 2011-10-14

A successful cyber-physical system, a complex interweaving of hardware and software with some part of the physical environment, depends on proper identification of the, often pre-existing, physical element. A bespoke “cyber” part of the system may then be designed from scratch. Optimal Mobile Sensing and Actuation Strategies in Cyber-physical Systems focuses on distributed-parameter systems the dynamics of which can be modelled with partial differential equations. These are very challenging to observe, their states and inputs being distributed throughout a spatial domain. Consequently, systematic approaches to the optimization of sensor location have to be devised for parameter estimation. The text begins by reviewing the field of cyber-physical systems and introducing background notions of distributed parameter systems and optimal observation theory. New research problems are then defined within this framework. Two important problems considered are optimal mobile sensor trajectory planning and the accuracy effects and allocation of remote sensors. These are followed up with a solution to the problem of optimal robust estimation. Actuation policies are then introduced into the framework with the purpose of improving estimation and optimizing the trajectories of both sensors and actuators simultaneously. The large number of illustrations within the text will assist the reader to visualize the application of the methods proposed. A group of similar examples are used throughout the book to help the reader assimilate the material more easily. The monograph concentrates on the use of methods for which a cyber-physical-systems infrastructure is required. The methods are computationally heavy and require mobile sensors and actuators with communications abilities. Application examples cover fields from environmental science to national security so that readers are encouraged to link the ideas of cyber-physical systems with their own research.

Structronic Systems: Smart Structures, Devices and Systems - Ardéshir Guran 1998-04-04

This book is concerned with electrostructural systems, particularly the interaction between the control of the structural and electrical (electronic) components. Structronics is a new emerging area with many potential applications in the design of high-performance structures, adaptive structures, high-precision systems, and micro-systems. As structures are increasingly being controlled by electronics, the problems of structural engineering can be separated less and less from those of electronic engineering and control engineering. This graduate-level book fills a gap in the literature by considering these problems while giving an overview of the current state of analysis, modelling and control for structronic systems. It is a coherent compendium written by leading experts in this new research area and gives readers a sophisticated toolbox that will allow them to tackle the modelling and control of smart structures. The inclusion of an extensive, up-to-date bibliography and index makes this volume an invaluable standard for professional reference. Because of the large number of contributions to the present volume, it has been subdivided into two parts, of which this is Part I. This book will be of interest to engineers, materials scientists, physicists and applied mathematicians. The synergistic integration of active (smart) materials, structures, sensors, actuators, and control electronics has redefined the concept of structures from a conventional passive elastic system to an active (life-like) structronic (structure + electronic) system with inherent self-sensing, diagnosis, and control capabilities. Because of its multi-disciplinary nature, the development of structronic systems has attracted researchers and scientists from many disciplines, such as structures, materials, control, electronics, mathematics, manufacturing, electromechanics, and mechanics. In practical applications, this new structronic system can be used as a component of high-performance machines or structural systems, or be an integrated structure itself performing designated function(s). Most common active (smart) materials, such as piezoelectrics, shape-memory alloys, electro- and magneto-strictive materials, and polyelectrolyte gels have been reviewed in Part I. Application examples are also provided and research issues reported on. While the first part focuses primarily on materials and structures, Part II emphasizes control applications and intelligent systems. With the information provided in this two-volume book, scientists and researchers can easily grasp the state of the art of smart materials and structronic systems, and are ready to pursue their own research and development endeavors. Contents:Part I: Materials and StructuresThe Piezoelectric Vibration Absorber Systems (J Holkamp & T Starchville, Jr.)Self-Sensing Control Applied to Smart Material Systems (E Garcia & L D Jones)An Introduction to Active Constrained Layer Damping Treatments (S Shen)Static and Dynamic Behavior of Adaptive Wings Carrying Externally Mounted Stores (L Librescu & O Song)Adaptive Design and Active Composite Material Systems (J Tani & J-H Qiu)Microelectromechanics and Functionality of Segmented Cylindrical Transducers (H-S Tzou et al.)Thermomechanical Modeling of Shape Memory Alloys and Composites (D Lagoudas et al.)Active-Passive Hybrid Structural Vibration Controls Via Piezoelectrical Networks (K-W Wang & S Kahn)On-Line Structural Damage Detection (H Shen)On Material Degradation and Failure of Piezoelectric Ceramics (H Sosa)Part II: Systems and ControlNear-Minimum-Time Slewing and Vibration Control of Smart Structures(Y Kim et al.)Active Polyelectrolyte Gels as Electrically Controllable Artificial Muscles and Intelligent Network Structures(M Shahinpoor)Active Dynamic Absorbers — Theory and Application(S Tewani et al.)Active Vibration Sink for Flexible Structures(C-S Chou)Distributed Modal-Space Control and Estimation with Electroelastic Applications(H Öz)Markov Parameters in System Identification: Old and New Concepts(M Q Phan et al.)Effect of System Non-Linearities on the Modified Model Reference Adaptive Control Scheme(H M Sardar & M Ahmadian)Extending Teach-Repeat to Nonholonomic Robots(S B Skaar & J-D Yoder)Dynamic Analysis and Active Vibration Control of Chain Drive Systems(C-A Tan et al.)Basic Concepts of Fault-Tolerant Computing Design(C Aktouf et al.) Readership: Applied mathematicians, applied physicists and mechanical engineers. Keywords:Structronic Systems;Smart Structures;Devices;Systems;Materials;ControlReviews: “… Professors Guran and Tzou coined the word Structronics in the early 1990s as a new discipline describing the synergetic integration of active materials, structures, sensors, actuators, and control electronics. The present two-volume set is the first comprehensive book ever published on this newly emerging area of engineering. I believe anyone who would like to know

what modern science and technology can offer for the design of better structures can learn a great deal from this book. Students and educators can use it as supplemental reading in an intermediate or advanced course on Structronics, or to gain a broader knowledge of systems thinking, model materials, and structural systems. Practicing engineers wishing to consolidate their knowledge in smart technology will also find this book an invaluable reference." Dr Bernd Schaefer Director Institute of Robotics and Mechatronics, Wessling, Germany

Estimation and Control of Distributed Parameter Systems - DESCH 1991-01-01

Control and Estimation of Distributed Parameter Systems - Gertrud Desch 1994

A semigroup formulation of a nonlinear size-structured distributed rate population model.- Damage detection and characterization in smart material structures.- Optimality conditions for non-qualified parabolic control problems.- Convergence of trajectories for a controlled viscous Burgers' equation.- Optimality conditions for boundary control problems of parabolic type.- Pontryagin's principle for optimal control problems governed by semilinear elliptic equations.- Invariance of the Hamiltonian in control problems for semilinear parabolic distributed parameter systems.- Rate distribution modeling for structured heterogeneous populations.- A model for a two-layered plate with interfacial slip.- Numerical solution of a constrained control problem for a phase field model.- Uniform stabilizability of nonlinearly coupled Kirchhoff plate equations.- Boundary temperature control for thermally coupled Navier-Stokes equations.- Adaptive estimation of nonlinear distributed parameter systems.- Decay estimates for the wave equation with internal damping.- On the controllability of the rotation of a flexible arm.- Modeling and controllability of interconnected elastic membranes.- On feedback controls for dynamic networks of strings and beams and their numerical simulation.- Various relaxations in optimal control of distributed parameter systems.- Convergence of an SQP-method for a class of nonlinear parabolic boundary control problems.- Conditional stability in determination of densities of heat sources in a bounded domain.- Boundary stabilization of the Korteweg-de Vries equation.- Controllability of the linear system of thermoelasticity: Dirichlet-Neumann boundary conditions.

Advances in Distributed Parameter Systems - Jean Auriol 2022-05-26

The proposed book presents recent breakthroughs for the control of distributed parameter systems and follows on from a workshop devoted to this topic. It introduces new and unified visions of the challenging control problems raised by distributed parameter systems. The book collects contributions written by prominent international experts in the control community, addressing a wide variety of topics. It spans the full range from theoretical research to practical implementation and follows three traverse axes: emerging ideas in terms of control strategies (energy shaping, prediction-based control, numerical control, input saturation), theoretical concepts for interconnected systems (with potential non-linear actuation dynamics), advanced applications (cable-operated elevators, traffic networks), and numerical aspects. Cutting-edge experts in the field contributed in this volume, making it a valuable reference source for control practitioners, graduate students, and scientists researching practical and theoretical solutions to the challenging problems raised by distributed parameter systems.

Intelligent Structural Systems - H.S. Tzou 2013-11-27

In recent years, "intelligent (sm. o. rt) structures antlllJ/stems" has become an emerging new research area that is multi-disciplinary in nature, requiring technical expertise from mechanical engineering, structural engineering, electrical engineering, applied mechanics, engineering mathematics, material science, computer science, biological science, etc. This technology is quite likely to contribute significant advancements in the design of high-performance structures, adaptive structures, high-precision systems, micro-systems, etc. Although this emerging area has been rapidly gathering momentum in the last few years, researchers are aware that to some extent only initial, but highly feasible studies of the concepts proposed have been conducted. It is obvious that many important, pertinent fundamental research subjects must yet be investigated and resolved in the near future. We have the privilege to invite a number of highly regarded research scientists and engineers to summarize and contribute the results of their years of research experience with the evolution of intelligent (smart) structures and systems to the collection of chapters contained in this book. Their research topics include current intelligent (smart) structures research activities, piezoelectric structures, shape memory alloy reinforced composites, applications of electrorheological fluids, intelligent sensor systems, adaptive precision trusses, damage detection, model refinement, control of axial moving continua, distributed transducers, etc. These subjects represent only a small portion of the complete picture; indeed, the fundamentally important development of smart or intelligent materials is not addressed in detail here.

Technology for Large Space Systems - 1989

Controller Design for Distributed Parameter Systems - Kirsten A. Morris 2020-06-01

This book addresses controller and estimator design for systems that vary both spatially and in time: systems like fluid flow, acoustic noise and flexible structures. It includes coverage of the selection and placement of actuators and sensors for such distributed-parameter systems. The models for distributed parameter systems are coupled ordinary/partial differential equations. Approximations to the governing equations, often of very high order, are required and this complicates both controller design and optimization of the hardware locations. Control system and estimator performance depends not only on the controller/estimator design but also on the location of the hardware. In helping the reader choose the best location for actuators and sensors, the analysis provided in this book is crucial because neither intuition nor trial-and-error is foolproof, especially where multiple sensors and actuators are required, and moving hardware can be difficult and costly. The mechatronic approach advocated, in which controller design is integrated with actuator location, can lead to better performance without increased cost. Similarly, better estimation can be obtained with carefully placed sensors. The text shows how proper hardware placement varies depending on whether, disturbances are present, whether the response should be reduced to an initial condition or whether controllability and/or observability have to be optimized. This book is aimed at non-specialists interested in learning controller design for distributed-parameter systems and the material presented has been used for student teaching. The relevant basic systems theory is presented and followed by a description of controller synthesis using lumped approximations. Numerical algorithms useful for efficient implementation in real engineering systems and practical computational challenges are also described and discussed.

Optimal Measurement Methods for Distributed Parameter System Identification - Dariusz Ucinski 2004-08-27

For dynamic distributed systems modeled by partial differential equations, existing methods of sensor location in parameter estimation experiments are either limited to one-dimensional spatial domains or require large investments in software systems. With the expense of scanning and moving sensors, optimal placement presents a critical problem.

Control of Distributed Parameter Systems 1989 - M. Amouroux 2014-06-28

This volume presents state-of-the-art reports on the theory, and current and future applications of control of distributed parameter systems. The papers cover the progress not only in traditional methodology and pure research in control theory, but also the rapid growth of its importance for different applications. This title will be of interest to researchers working in the areas of mathematics, automatic control, computer science and engineering.

Optimal Observation for Cyber-physical Systems - Zhen Song 2009-06-30

"Optimal Observation for Cyber-physical Systems" addresses the challenge, fundamental to the design of wireless sensor networks (WSNs), presented by the obligatory trade-off between precise estimates and system constraints. A unified theoretical framework, based on the well-established theory of optimal experimental design and providing consistent solutions to problems hitherto requiring a variety of approaches, is put forward to solve a large class of optimal observation problems. The Fisher information matrix plays a key role in this framework and makes it feasible to provide analytical solutions to some complex and important questions which could not be answered in the past. Readers with an applied background in WSN implementation will find all the understanding of the key theory of optimal experimental design they need within this book. The use of multiple examples to illustrate the theoretical parts of the book brings the subject into sharper focus than would an abstract theoretical disquisition.

Control of Higher–Dimensional PDEs - Thomas Meurer 2014-09-20

This monograph presents new model-based design methods for trajectory planning, feedback stabilization, state estimation, and tracking control of distributed-parameter systems governed by partial differential equations

(PDEs). Flatness and backstepping techniques and their generalization to PDEs with higher-dimensional spatial domain lie at the core of this treatise. This includes the development of systematic late lumping design procedures and the deduction of semi-numerical approaches using suitable approximation methods. Theoretical developments are combined with both simulation examples and experimental results to bridge the gap between mathematical theory and control engineering practice in the rapidly evolving PDE control area. The text is divided into five parts featuring: - a literature survey of paradigms and control design methods for PDE systems - the first principle mathematical modeling of applications arising in heat and mass transfer, interconnected multi-agent systems, and piezo-actuated smart elastic structures - the generalization of flatness-based trajectory planning and feedforward control to parabolic and biharmonic PDE systems defined on general higher-dimensional domains - an extension of the backstepping approach to the feedback control and observer design for parabolic PDEs with parallelepiped domain and spatially and time varying parameters - the development of design techniques to realize exponentially stabilizing tracking control - the evaluation in simulations and experiments Control of Higher-Dimensional PDEs — Flatness and Backstepping Designs is an advanced research monograph for graduate students in applied mathematics, control theory, and related fields. The book may serve as a reference to recent developments for researchers and control engineers interested in the analysis and control of systems governed by PDEs.

Vibration Control Methods of Mechanical Distributed Parameter Systems - Xueyan Xing 2021-05-18

This book aims at investigating PDE modeling and vibration control of some typical mechanical distributed parameter systems. Several control methods are proposed to realize stabilization of the closed-loop system with the help of mathematical tools and stability analysis methods. Besides, some common engineering problems, such as input and output constraints, are also involved in the control design. This book offers a comprehensive introduction of mechanical distributed parameter systems, including PDE modeling, controller design and stability analysis. The related fundamental mathematical tools and analytical approaches involving in the PDE modeling and controller are also provided, which broadens its reach to readers.

Control and Estimation of Distributed Parameter Systems - F. Kappel 1989

Control of Distributed Parameter Systems 1982 - Jean-Pierre Babary 2014-05-16

Control of Distributed Parameter Systems 1982 covers the proceeding of the Third International Federation of Automatic Control (IFAC) Symposium on Control of Distributed Parameter Systems. The book reviews papers that tackle issues concerning the control of distributed parameter systems, such as modeling, identification, estimation, stabilization, optimization, and energy system. The topics that the book tackles include notes on optimal and estimation result of nonlinear systems; approximation of the parameter identification problem in distributed parameters systems; and optimal control of a punctually located heat source. This text also encompasses the stabilization of nonlinear parabolic equations and the decoupling approach to the control of large spaceborne antenna systems. Stability of Hilbert space contraction semigroups and the tracking problem in the fractional representation approach are also discussed. This book will be of great interest to researchers and professionals whose work concerns automated control systems.

Distributed Parameter Systems - Willis Harmon Ray 1978

Advances in Control Systems - C. T. Leondes 2014-11-30

Advances in Control Systems: Theory and Applications, Volume 7 provides information pertinent to the significant progress in the field of control and systems theory and applications. This book covers the important general area of computational problems in random and deterministic dynamic systems. Organized into six chapters, this volume begins with an overview of the controllability of a stochastic system. This text then presents a survey and status of methods for nonlinear minimal variance filtering. Other chapters consider some possible pitfalls and develop practical approximate nonlinear filters. This book discusses as well the area of computational problems and techniques for optimal nonlinear control problems. Computer simulation results are also included in order to show a number of the key results. The final chapter deals with the development of algorithms for the determination of the optimal control of distributed parameter systems, which pervades many areas of engineering endeavor. This book is a valuable resource for mathematicians and engineers.

Control and Estimation of Distributed Parameter Systems: Nonlinear Phenomena - Wolfgang Desch 2012-10-24

22 papers on control of nonlinear partial differential equations highlight the area from a broad variety of viewpoints. They comprise theoretical considerations such as optimality conditions, relaxation, or stabilizability theorems, as well as the development and evaluation of new algorithms. A significant part of the volume is devoted to applications in engineering, continuum mechanics and population biology.

An Index - A. V. Balakrishnan M. Thoma 2013-11-21

Estimation and Control Problems for Stochastic Partial Differential Equations - Pavel S. Knopov 2013-09-18

Focusing on research surrounding aspects of insufficiently studied problems of estimation and optimal control of random fields, this book exposes some important aspects of those fields for systems modeled by stochastic partial differential equations. It contains many results of interest to specialists in both the theory of random fields and optimal control theory who use modern mathematical tools for resolving specific applied problems, and presents research that has not previously been covered. More generally, this book is intended for scientists, graduate, and post-graduates specializing in probability theory and mathematical statistics. The models presented describe many processes in turbulence theory, fluid mechanics, hydrology, astronomy, and meteorology, and are widely used in pattern recognition theory and parameter identification of stochastic systems. Therefore, this book may also be useful to applied mathematicians who use probability and statistical methods in the selection of useful signals subject to noise, hypothesis distinguishing, distributed parameter systems optimal control, and more. Material presented in this monograph can be used for education courses on the estimation and control theory of random fields.

Distributed Parameter Control Systems - S. G. Tzafestas 1982-01-01

Covers applications in chemical engineering, nuclear reactors, petroleum reservoirs-aquifers, & heat exchangers. Covers simulation, identification, state estimation, stability, control, numerical approximation methods, etc.

Systems and Control in the Twenty-First Century - Christopher I. Byrnes 1997-02-01

The mathematical theory of networks and systems has a long, and rich history, with antecedents in circuit synthesis and the analysis, design and synthesis of actuators, sensors and active elements in both electrical and mechanical systems. Fundamental paradigms such as the state-space real ization of an input/output system, or the use of feedback to prescribe the behavior of a closed-loop system have proved to be as resilient to change as were the practitioners who used them. This volume celebrates the resiliency to change of the fundamental con cepts underlying the mathematical theory of networks and systems. The articles presented here are among those presented as plenary addresses, invited addresses and minisymposia presented at the 12th International Symposium on the Mathematical Theory of Networks and Systems, held in St. Louis, Missouri from June 24 - 28, 1996. Incorporating models and methods drawn from biology, computing, materials science and math ematics, these articles have been written by leading researchers who are on the vanguard of the development of systems, control and estimation for the next century, as evidenced by the application of new methodologies in distributed parameter systems, linear nonlinear systems and stochastic sys tems for solving problems in areas such as aircraft design, circuit simulation, imaging, speech synthesis and visionics.

Control Theory of Systems Governed by Partial Differential Equations - Abdul Kadir Aziz 1977

Estimation Techniques for Distributed Parameter Systems - H.T. Banks 2012-12-06

The research detailed in this monograph was originally motivated by our interest in control problems involving partial and delay differential equations. Our attempts to apply control theory techniques to such prob lems in several areas of science convinced us that in the need for better and more detailed models of distributed/ continuum processes in biology and mechanics lay a rich, interesting, and challenging class of fundamen tal questions. These questions, which involve science and mathematics, are typical of those arising in inverse or parameter estimation problems. Our efforts on inverse problems for distributed parameter systems, which are infinite dimensional in the most common realizations, began about seven years ago at a time when rapid advances in computing

capabilities and availability held promise for significant progress in the development of a practically useful as well as theoretically sound methodology for such problems. Much of the research reported in our presentation was not begun when we outlined the plans for this monograph some years ago. By publishing this monograph now, when only a part of the originally intended topics are covered (see Chapter VII in this respect), we hope to stimulate the research and interest of others in an area of scientific en deavor which has exceeded even our optimistic expectations with respect to excitement, opportunity, and stimulation. The computer revolution alluded to above and the development of new codes allow one to solve rather routinely certain estimation problems that would have been out of the question ten years ago.

A Functional Analysis Framework for Modeling, Estimation and Control in Science and Engineering - H.T. Banks 2012-06-18

A Modern Framework Based on Time-Tested MaterialA Functional Analysis Framework for Modeling, Estimation and Control in Science and Engineering presents functional analysis as a tool for understanding and treating distributed parameter systems. Drawing on his extensive research and teaching from the past 20 years, the author explains how functional

Stochastic Control - N.K. Sinha 2014-05-23

Stochastic control, the control of random processes, has become increasingly more important to the systems analyst and engineer. The Second IFAC Symposium on Stochastic Control represents current thinking on all aspects of stochastic control, both theoretical and practical, and as such represents a further advance in the understanding of such systems.

Control of Distributed Parameter Systems - S. P. Banks 2014-05-18

Control of Distributed Parameter Systems covers the proceedings of the Second IFAC Symposium, Coventry, held in Great Britain from June 28 to July 1, 1977. The book focuses on the methodologies, processes, and techniques in the control of distributed parameter systems, including boundary value control, digital transfer matrix, and differential equations. The selection first discusses the asymptotic methods in the optimal control of distributed systems; applications of distributed parameter control theory of a survey; and dual variational inequalities for external eigenvalue problems. The book also ponders on stochastic differential equations in Hilbert space and their application to delay systems and linear quadratic optimal control problem over an infinite time horizon for a class of distributed parameter systems. The manuscript investigates the semigroup approach to boundary value control and stability of nonlinear distributed parameter systems. Topics include boundary control action implemented through a dynamical system; classical boundary value controls; stability of nonlinear systems; and feedback control on the boundary. The text also focuses on the functional analysis interpretation of Lyapunov stability; method of multipliers for a class distributed parameter systems; and digital transfer matrix approach to distributed system simulation. The selection is a dependable source of data for readers interested in the control of distributed parameter systems.

Scientific and Technical Aerospace Reports - 1994