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Optimal Sampled-Data Control Systems *Hard Disk Drive Servo Systems* *Analysis and Synthesis of Linear Control Systems* **Multi-View Geometry Based Visual Perception and Control of Robotic Systems** **Iterative Learning Control** **Governance, Social Control and Legal Reform in China** **Elements of Control Systems Analysis** H? Control and Its Applications **Bifurcation Control** H2 Optimal Control *Macro-control and Economic Development in China* *The Simulation of Area Wide Real Time Traffic Control. Final Report* **Intelligentized Methodology for Arc Welding Dynamical Processes** Adaptive Control of Underactuated Mechanical Systems **Analog and Digital Control System Design** **Parenting Style and Children's Time Preference** *Distributed Cooperative Control of Multi-agent Systems* BURNING AND ITS AE CONTROL IN DRY GRINDING OF HSS WITH CBN WHEELS. **Chaos Control** **Adaptive Identification and Control of Uncertain Systems with Non-smooth Dynamics** *Robust and H_ Control* *Dynamic Systems with Time Delays: Stability and Control* **Linear Feedback Control** **Optimal Supervisory Control of Automated Manufacturing Systems** **Robust Discrete-Time Flight Control of UAV with External Disturbances** Disturbance Observer-Based Control *Robust Adaptive Control for Fractional-Order Systems with Disturbance and Saturation* Nonlinear Estimation and Control of Automotive Drivetrains *Control of Axially Moving Systems* **Linear Systems and Optimal Control** Fractional-order Systems and Controls *Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems* **Nonlinear Pinning Control of Complex Dynamical Networks** *Victorian Contagion* **Computer Numerical Control** **Iterative Learning Control** Advanced Technologies in Modern Robotic Applications **Integrated Vehicle Dynamics and Control** **Networked and Event-Triggered Control Approaches in Cyber-Physical Systems** **Robust and H_ Control**

The series Advances in Industrial Contral aims to report and encourage technology transfer in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. New theory, new controllers, actuators, sensors, new industrial processes, computer methods, new applications, new philosophies ... , new challenges. Much of this development work resides in industrial reports, feasibility study papers and the reports of advanced collaborative projects. The series offers an opportunity for researchers to present an extended exposition of such new work in all aspects of industrial control for wider and rapid dissemination. From time to time a particular practical control problem emerges as a challenge to the design capabilities of the control community. One example has been the activated sludge process in wastewater systems where the process is highly nonlinear and measurements are few. A second example is the hard disk drive servo system. These widely used systems are critical to the operation of modem computing devices. They are nonlinear and demand a high-precision control system for the operations of track seeking and track following. There are also alternative actuation systems available to achieve these objectives. In this Advances in Industrial Control monograph B.M. Chen, T.H. Lee and V. This book provides readers with a comprehensive coverage of iterative learning control. The book can be used as a text or reference for a course at graduate level and is also suitable for self-study and for industry-oriented courses of continuing education. Ranging from aerodynamic curve identification robotics to functional neuromuscular stimulation, Iterative Learning Control (ILC), started in the early 80s, is found to have wide applications in practice. Generally, a system under control may have uncertainties in its dynamic model and its environment. One attractive point in ILC lies in the utilisation of the system repetitiveness to reduce such uncertainties and in turn to improve the control performance by operating the system repeatedly. This monograph emphasises both theoretical and practical aspects of ILC. It provides some recent developments in ILC convergence and robustness analysis. The book also considers issues in ILC design. Several practical applications are presented to illustrate the effectiveness of ILC. The applied examples provided in this monograph are particularly beneficial to readers who wish to capitalise the system repetitiveness to improve system control performance. H... control theory is a subject that deals with the minimisation of the H... norm of the transfer matrix from an exogenous disturbance to a pertinent controlled output of a given plant. H... Control and Its Applications examines both the theoretical and practical aspects of H... control from the angle of the structural properties of linear systems. Constructive algorithms for finding solutions to general singular H... control problems are presented, as well as solutions to general H... almost disturbance decoupling problems, and the applications of the theory to real-life problems with actual implementations is also presented. The book deals with all such issues for general continuous - and discrete-time systems. The book can be used in graduate courses in departments of aeronautics and astronautics, applied mathematics, chemical engineering, electrical engineering and mechanical engineering. It is also invaluable for practising engineers in industry. Chaos control refers to purposefully manipulating chaotic dynamical behaviors of some complex nonlinear systems. There exists no similar control theory-oriented book available in the market that is devoted to the subject of chaos control, written by control engineers for control engineers. World-renowned leading experts in the field provide their state-of-the-art survey about the extensive research that has been done over the last few years in this subject. The new technology of chaos control has major impact on novel engineering applications such as telecommunications, power systems, liquid mixing, internet technology, high-performance circuits and devices, biological systems modeling

like the brain and the heart, and decision making. The book is not only aimed at active researchers in the field of chaos control involving control and systems engineers, theoretical and experimental physicists, and applied mathematicians, but also at a general audience in related fields. This monograph presents the state-of-the-art developments in the design of behaviorally and structurally optimal livenessen-forcing Petri net supervisors with computationally tractable approaches. It details optimal supervisory control problems arising in automated production systems and outlines a methodology to achieve the optimality purposes of deadlock prevention via converting a variety of problems under consideration into integer linear programming models. The book includes a reference bibliography at the end of each chapter and a complete index. Welding handicraft is one of the most primordial and traditional technics, mainly by manpower and human experiences. Weld quality and ef?ciency are, therefore, straitly limited by the welder’s skill. In the modern manufacturing, automatic and robotic welding is becoming an inevitable trend. However, it is dif?cult for au- matic and robotic welding to reach high quality due to the complexity, uncertainty and disturbance during welding process, especially for arc welding dynamics. The information acquirement and real-time control of arc weld pool dynamical process during automatic or robotic welding always are perplexing problems to both te- nologist in weld ?eld and scientists in automation. This book presents some application researches on intelligentized methodology in arc welding process, such as machine vision, image processing, fuzzy logical, neural networks, rough set, intelligent control and other arti?cial intelligence me- ods for sensing, modeling and intelligent control of arc welding dynamical process. The studies in the book indicate that the designed vision sensing and control s- tems are able to partially emulate a skilled welder’s intelligent behaviors: observing, estimating, decision-making and operating, and show a great potential and prom- ing prospect of arti?cial intelligent technologies in the welding manufacturing. A treatise on investigating tracking control and synchronization control of fractional-order nonlinear systems with system uncertainties, external disturbance, and input saturation Robust Adaptive Control for Fractional-Order Systems, with Disturbance and Saturation provides the reader with a good understanding on how to achieve tracking control and synchronization control of fractional-order nonlinear systems with system uncertainties, external disturbance, and input saturation. Although some texts have touched upon control of fractional-order systems, the issues of input saturation and disturbances have rarely been considered together. This book offers chapter coverage of fractional calculus and fractional-order systems; fractional-order PID controller and fractional-order disturbance observer; design of fractional-order controllers for nonlinear chaotic systems and some applications; sliding mode control for fractional-order nonlinear systems based on disturbance observer; disturbance observer based neural control for an uncertain fractional-order rotational mechanical system; adaptive neural tracking control for uncertain fractional-order chaotic systems subject to input saturation and disturbance; stabilization control of continuous-time fractional positive systems based on disturbance observer; sliding mode synchronization control for fractional-order chaotic systems with disturbance; and more. Based on the approximation ability of the neural network (NN), the adaptive neural control schemes are reported for uncertain fractional-order nonlinear systems Covers the disturbance estimation techniques that have been developed to alleviate the restriction faced by traditional feedforward control and reject the effect of external disturbances for uncertain fractional-order nonlinear systems By combining the NN with the disturbance observer, the disturbance observer based adaptive neural control schemes have been studied for uncertain fractional-order nonlinear systems with unknown disturbances Considers, together, the issue of input saturation and the disturbance for the control of fractional-order nonlinear systems in the present of system uncertainty, external disturbance, and input saturation Robust Adaptive Control for Fractional-Order Systems, with Disturbance and Saturation can be used as a reference for the academic research on fractional-order nonlinear systems or used in Ph.D. study of control theory and engineering. This book presents up-to-date research developments and novel methodologies to solve various stability and control problems of dynamic systems with time delays. First, it provides the new introduction of integral and summation inequalities for stability analysis of nominal time-delay systems in continuous and discrete time domain, and presents corresponding stability conditions for the nominal system and an applicable nonlinear system. Next, it investigates several control problems for dynamic systems with delays including H(infinity) control problem Event-triggered control problems; Dynamic output feedback control problems; Reliable sampled-data control problems. Finally, some application topics covering filtering, state estimation, and synchronization are considered. The book will be a valuable resource and guide for graduate students, scientists, and engineers in the system sciences and control communities. Victorian Contagion: Risk and Social Control in the Victorian Literary Imagination examines the literary and cultural production of contagion in the Victorian era and the way that production participated in a moral economy of surveillance and control. In this book, I attempt to make sense of how the discursive practice of contagion governed the interactions and correlations between medical science, literary creation, and cultural imagination. Victorians dealt with the menace of contagion by theorizing a working motto in claiming the goodness and godliness in cleanliness which was theorized, realized, and radicalized both through practice and imagination. The Victorian discourse around cleanliness and contagion, including all its treatments and preventions, developed into a culture of medicalization, a perception of surveillance, a politics of health, an economy of morality, and a way of thinking. This book is an attempt to understands the literary and cultural elements which contributed to fear and anticipation of contagion, and to explain why and how these elements still matter to us today. This text presents a state-of-the-art view of H2, optimal control theory and the various design methods associated with it. The practical implications of these methods are considered throughout, and numerically implementable algorithms are provided for every aspect of the book, be it analysis or design. Such algorithms can easily be implemented by the use of commercially available software packages on linear algebra such as MATLAB. In this book, we collected recent results on the control of underactuated mechanical systems subject to internal uncertainties and external disturbances. The strategy developed is so universal that it is not restricted to a specific system but a large class of underactuated systems. Several benchmark systems are studied in this book, including detailed literature review, system dynamics derivation, control problem formulation, and simulation verification. The control strategy developed in chapter 4 is able to stabilize all these

benchmark systems with satisfactory performance regardless of the underactuated dynamics and various uncertainties. The book is written as a text suitable for graduate students in the advanced course for the control of underactuated systems. It also provides valuable tools for researchers and practicing engineers working on the control of underactuated mechanical systems. Contents:IntroductionPreliminariesUnderactuated System Dynamics and Coordinate TransformationController DesignCart Pole SystemOverhead CranesTORA SystemRotary Inverted PendulumVibration AbsorberPendubotBibliographyIndex Readership: Graduate students, researchers, and academics in control engineering, mechanical engineering, electrical & electronic engineering, and optimization and control theory. Keywords:Adaptive Control;Underactuated Systems;Approximation Technique A knowledge of linear systems provides a firm foundation for the study of optimal control theory and many areas of system theory and signal processing. State-space techniques developed since the early sixties have been proved to be very effective. The main objective of this book is to present a brief and somewhat complete investigation on the theory of linear systems, with emphasis on these techniques, in both continuous-time and discrete-time settings, and to demonstrate an application to the study of elementary (linear and nonlinear) optimal control theory. An essential feature of the state-space approach is that both time-varying and time-invariant systems are treated systematically. When time-varying systems are considered, another important subject that depends very much on the state-space formulation is perhaps real-time filtering, prediction, and smoothing via the Kalman filter. This subject is treated in our monograph entitled "Kalman Filtering with Real-Time Applications" published in this Springer Series in Information Sciences (Volume 17). For time-invariant systems, the recent frequency domain approaches using the techniques of Adamjan, Arov, and Krein (also known as AAK), balanced realization, and oo H theory via Nevanlinna-Pick interpolation seem very promising, and this will be studied in our forthcoming monograph entitled "Mathematical Ap proach to Signal Processing and System Theory". The present elementary treatise on linear system theory should provide enough engineering and mathe of these two subjects. In the early 1970s, fuzzy systems and fuzzy control theories added a new dimension to control systems engineering. From its beginnings as mostly heuristic and somewhat ad hoc, more recent and rigorous approaches to fuzzy control theory have helped make it an integral part of modern control theory and produced many exciting results. Yesterday's "art Mathematical Preliminary - Development of Block Diagrams for Control Systems - Quantitative and Qualitative Analyses of Control Systems - Computer Simulation and Realization - Design Criteria, Constraints, and Feedback - The Root-Locus Method - Frequency-Domain Techniques - The Inward Approach--Choice of Overall Transfer Functions - Implementation--Linear Algebraic Method - State-Space Design - Discrete-Time System Analysis - Discrete-Time System Design - PID Controllers. A comprehensive overview of integrated vehicle system dynamics exploring the fundamentals and new and emerging developments This book provides a comprehensive coverage of vehicle system dynamics and control, particularly in the area of integrated vehicle dynamics control. The book consists of two parts, (1) development of individual vehicle system dynamic model and control methodology; and (2) development of integrated vehicle dynamic model and control methodology. The first part focuses on investigating vehicle system dynamics and control according to the three directions of vehicle motions, including longitudinal, vertical, and lateral. Corresponding individual control systems, e.g. Anti-lock Brake System (ABS), Active Suspension, Electric Power Steering System (EPS), are introduced and developed respectively. Particular attention is paid in the second part of the book to develop integrated vehicle dynamic control system. Integrated vehicle dynamics control system is an advanced system that coordinates all the chassis control systems and components to improve the overall vehicle performance including safety, comfort, and economy. Integrated vehicle dynamics control has been an important research topic in the area of vehicle dynamics and control over the past two decades. The research topic on integrated vehicle dynamics control is investigated comprehensively and intensively in the book through both theoretical analysis and experimental study. In this part, two types of control architectures, i.e. centralized and multi-layer, have been developed and compared to demonstrate their advantages and disadvantages. Integrated vehicle dynamics control is a hot topic in automotive research; this is one of the few books to address both theory and practice of integrated systems Comprehensively explores the research area of integrated vehicle dynamics and control through both theoretical analysis and experimental study Addresses a full range of vehicle system topics including tyre dynamics, chassis systems, control architecture, 4 wheel steering system and design of control systems using Linear Matrix Inequality (LMI) Method Adaptive Identification and Control of Uncertain Systems with Nonsmooth Dynamics reports some of the latest research on modeling, identification and adaptive control for systems with nonsmooth dynamics (e.g., backlash, dead zone, friction, saturation, etc). The authors present recent research results for the modelling and control designs of uncertain systems with nonsmooth dynamics, such as friction, dead-zone, saturation and hysteresis, etc., with particular applications in servo systems. The book is organized into 19 chapters, distributed in five parts concerning the four types of nonsmooth characteristics, namely friction, dead-zone, saturation and hysteresis, respectively. Practical experiments are also included to validate and exemplify the proposed approaches. This valuable resource can help both researchers and practitioners to learn and understand nonlinear adaptive control designs. Academics, engineers and graduate students in the fields of electrical engineering, control systems, mechanical engineering, applied mathematics and computer science can benefit from the book. It can be also used as a reference book on adaptive control for servo systems for students with some background in control engineering. Explains the latest research outputs on modeling, identification and adaptive control for systems with nonsmooth dynamics Provides practical application and experimental results for robotic systems, and servo motors We conduct an evaluation of a randomized early childhood intervention on children's time preference. The Jamaican-based home visiting program is aimed at improving knowledge of child development and child-rearing practices. Analyzing the impact of a weekly home visiting program for over 500 households living in poor rural villages in China, we find a significantly positive impact on preschool children's patience measured two years after treatment. The intervention has a significant and lasting impact on parenting style but no persistent effect on other likely intermediating factors. Our findings are consistent with the literature in developmental psychology, which suggest child-rearing practices such as parenting style is closely correlated with

children's time preference. We also find the impact of the early childhood intervention on children's patience is more prominent if the treated samples are girls, left-behind children cared for by grandparents, children in families with high socioeconomic status and less harsh parenting styles, and children of high cognition. Less mathematics and more working examples make this textbook suitable for almost any type of user. Due to its abilities to compensate disturbances and uncertainties, disturbance observer based control (DOBC) is regarded as one of the most promising approaches for disturbance-attenuation. One of the first books on DOBC, Disturbance Observer Based Control: Methods and Applications presents novel theory results as well as best practices for applica The insertion of communication networks in feedback control loops complicates analysis and synthesis of cyber-physical systems (CPSs), and network-induced uncertainties may degrade system control performance. Thus, this book researches networked delay compensation and event-triggered control approaches for a series of CPSs subject to network-induced uncertainties. The authors begin with an introduction to the concepts and challenges of CPSs, followed by an overview of networked control approaches and event-triggered control strategies in CPSs. Then, networked delay compensation and event-triggered control approaches are proposed for CPSs with network communication delay, data dropout, signal quantization, and event-triggered communication. More specifically, networked delay compensation approaches are proposed for linear/nonlinear networked controlled plants with time-varying and random network communication delays and data dropouts. To reduce computational burden and network communication loads in CPSs, event-triggered control, self-triggered control, co-design of event-triggered control and quantized control techniques, and event-triggered disturbance rejection control approaches are also presented. This book is an essential text for researchers and engineers interested in cybersecurity, networked control, and CPSs. It would also prove useful for graduate students in the fields of science, engineering, and computer science. Among the many techniques for designing linear multivariable analogue controllers, the two most popular optimal ones are H2 and H-infinity optimization. The fact that most new industrial controllers are digital provides strong motivation for adapting or extending these techniques to digital control systems. This book, now available as a corrected reprint, attempts to do so. Part I presents two indirect methods of sampled-data controller design: These approaches include approximations to a real problem, which involves an analogue plant, continuous-time performance specifications, and a sampled-data controller. Part II proposes a direct attack in the continuous-time domain, where sampled-data systems are time-varying. The findings are presented in forms that can readily be programmed in, e.g., MATLAB. H-infinity control theory deals with the minimization of the H-norm of the transfer matrix from an exogenous disturbance to a pertinent controlled output of a given plant. This comprehensive book examines both the theoretical and practical aspects of H-infinity control from the angle of the structural properties of linear systems. This book describes visual perception and control methods for robotic systems that need to interact with the environment. Multiple view geometry is utilized to extract low-dimensional geometric information from abundant and high-dimensional image information, making it convenient to develop general solutions for robot perception and control tasks. In this book, multiple view geometry is used for geometric modeling and scaled pose estimation. Then Lyapunov methods are applied to design stabilizing control laws in the presence of model uncertainties and multiple constraints. This book studies selected discrete-time flight control schemes for fixed-wing unmanned aerial vehicle (UAV) systems in the presence of system uncertainties, external disturbances and input saturation. The main contributions of this book for UAV systems are as follows: (i) the proposed integer-order discrete-time control schemes are based on the designed discrete-time disturbance observers (DTDOs) and the neural network (NN); and (ii) the fractional-order discrete-time control schemes are developed by using the fractional-order calculus theory, the NN and the DTDOs. The book offers readers a good understanding of how to establish discrete-time tracking control schemes for fixed-wing UAV systems subject to system uncertainties, external wind disturbances and input saturation. It represents a valuable reference guide for academic research on uncertain UAV systems, and can also support advanced / Ph.D. studies on control theory and engineering. This book provides a comprehensive guideline on dynamic analysis and vibration control of axially moving systems. First, the mathematical models of various axially moving systems describing the string, beam, belt, and plate models are developed. Accordingly, dynamical issues such as the equilibrium configuration, critical velocity, stability, bifurcation, and further chaotic dynamics are analyzed. Second, this book covers the design of the control schemes based on the hitherto control strategies for axially moving systems: feedback control using the transfer function, variable structure control, control by regulating the axial velocity, wave cancellation approach, boundary control using the Lyapunov method, adaptive control, and hybrid control methods. Finally, according to the contents discussed in the book, specific aspects are outlined for initiating future research endeavors to be undertaken concerning axially moving systems. This book is useful to graduate students and researchers in industrial sectors such as continuous manufacturing systems, transport systems, power transmission systems, and lifting systems not to mention in academia. This book presents in a systematic manner the advanced technologies used for various modern robot applications. By bringing fresh ideas, new concepts, novel methods and tools into robot control, robot vision, human robot interaction, teleoperation of robot and multiple robots system, we are to provide a state-of-the-art and comprehensive treatment of the advanced technologies for a wide range of robotic applications. Particularly, we focus on the topics of advanced control and obstacle avoidance techniques for robot to deal with unknown perturbations, of visual servoing techniques which enable robot to autonomously operate in a dynamic environment, and of advanced techniques involved in human robot interaction. The book is primarily intended for researchers and engineers in the robotic and control community. It can also serve as complementary reading for robotics at the both graduate and undergraduate levels. This monograph studies the design of robust, monotonically-convergent iterative learning controllers for discrete-time systems. It presents a unified analysis and design framework that enables designers to consider both robustness and monotonic convergence for typical uncertainty models, including parametric interval uncertainties, iteration-domain frequency uncertainty, and iteration-domain stochastic uncertainty. The book shows how to use robust iterative learning control in the face of model uncertainty. This book presents two nonlinear control strategies for complex dynamical networks. First, sliding-mode control is used, and then the inverse optimal control

approach is employed. For both cases, model-based is considered in Chapter 3 and Chapter 5; then, Chapter 4 and Chapter 6 are based on determining a model for the unknow system using a recurrent neural network, using on-line extended Kalman filtering for learning. The book is organized in four sections. The first one covers mathematical preliminaries, with a brief review for complex networks, and the pinning methodology. Additionally, sliding-mode control and inverse optimal control are introduced. Neural network structures are also discussed along with a description of the high-order ones. The second section presents the analysis and simulation results for sliding-mode control for identical as well as non-identical nodes. The third section describes analysis and simulation results for inverse optimal control considering identical or non-identical nodes. Finally, the last section presents applications of these schemes, using gene regulatory networks and microgrids as examples. A detailed and systematic introduction to the distributed cooperative control of multi-agent systems from a theoretical, network perspective Features detailed analysis and discussions on the distributed cooperative control and dynamics of multi-agent systems Covers comprehensively first order, second order and higher order systems, swarming and flocking behaviors Provides a broad theoretical framework for understanding the fundamentals of distributed cooperative control This book, together with Economic Development and Reform Deepening in China is a collection of papers written in recent years about maintaining economic growth, managing inflation, the relationship between growth and structural adjustment, control of price growth, maintaining stable economic development, and other relevant aspects of macro-control, economic development, and deepening reform. Chinese government adopts many of the recommendations put forward by the book. H-infinity control theory deals with the minimization of the H-norm of the transfer matrix from an exogenous disturbance to a pertinent controlled output of a given plant. This comprehensive book examines both the theoretical and practical aspects of H-infinity control from the angle of the structural properties of linear systems. Bifurcation control refers to the task of designing a controller that can modify the bifurcation properties of a given nonlinear system, so as to achieve some desirable dynamical behaviors. There exists no similar control theory-oriented book available in the market that is devoted to the subject of bifurcation control, written by control engineers for control engineers. World-renowned leading experts in the field provide their state-of-the-art survey about the extensive research that has been done over the last few years in this subject. The book is not only aimed at active researchers in the field of bifurcation control and its applications, but also at a general audience in related fields. Nonlinear Estimation and Control of Automotive Drivetrains discusses the control problems involved in automotive drivetrains, particularly in hydraulic Automatic Transmission (AT), Dual Clutch Transmission (DCT) and Automated Manual Transmission (AMT). Challenging estimation and control problems, such as driveline torque estimation and gear shift control, are addressed by applying the latest nonlinear control theories, including constructive nonlinear control (Backstepping, Input-to-State Stable) and Model Predictive Control (MPC). The estimation and control performance is improved while the calibration effort is reduced significantly. The book presents many detailed examples of design processes and thus enables the readers to understand how to successfully combine purely theoretical methodologies with actual applications in vehicles. The book is intended for researchers, PhD students, control engineers and automotive engineers. Hong Chen is a professor at the State Key Laboratory of Automotive Simulation and Control, and the Department of Control Science and Engineering at Jilin University. Bingzhao Gao is an associate professor at the State Key Laboratory of Automotive Simulation and Control at Jilin University. This book outlines how community sentences and early release options are administered in China. Chen provides empirical insights into the emerging community sector of the Chinese penal system, and illustrates how Chinese criminal courts decide between imprisonment and community sentences. Drawing on interviews with government and non-governmental supervisors, this methodological and rigorous study offers an in-depth discussion of the enforcement of these community sanctions and measures (CSM). By using the CSM reform as an example, this book illustrates the adaptation of Chinese governance and social control. Ultimately, Chen argues that the current model of governance in China (disciplinary governance) cannot guarantee an effective state-agent relationship; it also denies local governments sufficient legitimacy to secure social stability. Finally, proposing that only the rule of law and an active judiciary can complement these two deficiencies, this book will be of great interest to scholars of criminology, law, and penology, as well as anyone who is interested in how China is held together in a socio-legal sense. Fractional-order Systems and Controls details the use of fractional calculus in the description and modeling of systems, and in a range of control design and practical applications. It is largely self-contained, covering the fundamentals of fractional calculus together with some analytical and numerical techniques and providing MATLAB® codes for the simulation of fractional-order control (FOC) systems. Many different FOC schemes are presented for control and dynamic systems problems. Practical material relating to a wide variety of applications is also provided. All the control schemes and applications are presented in the monograph with either system simulation results or real experimental results, or both. Fractional-order Systems and Controls provides readers with a basic understanding of FOC concepts and methods, so they can extend their use of FOC in other industrial system applications, thereby expanding their range of disciplines by exploiting this versatile new set of control techniques.

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