Adaptive Control Solution Manual

Get a complete understanding of aircraft control and simulation Aircraft Control and Simulation: Dynamics, Controls Design, and Autonomous Systems, Third Edition is a comprehensive guide to aircraft control and simulation. This updated text covers flight control systems, flight dynamics, aircraft modeling, and flight simulation from both classical design and modern perspectives, as well as two new chapters on the modeling, simulation, and adaptive control of unmanned aerial vehicles. With detailed examples, including relevant MATLAB calculations and FORTRAN codes, this approachable yet detailed reference also provides access to supplementary materials, including chapter problems and an instructor's solution manual. Aircraft control, as a subject area, combines an understanding of aerodynamics with knowledge of the physical systems of an aircraft. The ability to analyze the performance of an aircraft both in the real world and in computer-simulated flight is essential to maintaining proper control and function of the aircraft. Keeping up with the skills necessary to perform this analysis is critical for you to thrive in the aircraft control field. Explore a steadily progressing list of topics, including equations of motion and aerodynamics, classical controls, and more advanced control methods Consider detailed control design examples using computer numerical tools and simulation examples Understand control design methods as they are applied to aircraft nonlinear math models Access updated content about unmanned aircraft (UAVs) Aircraft Control and Simulation: Dynamics, Controls Design, and Autonomous Systems, Third Edition is an essential reference for engineers and designers involved in the development of aircraft and aerospace systems and computer-based flight simulations, as well as upper-level undergraduate and graduate students studying mechanical and aerospace engineering.

This book is a simple and didactic account of the developments and practical applications of predictive, adaptive predictive, and optimized adaptive control from a perspective of stability, including the latest methodology of adaptive predictive expert (ADEX) control. ADEX Optimized Adaptive Control Systems is divided into six parts, with exercises and real-time simulations provided for the reader as appropriate. The text begins with the conceptual and intuitive knowledge of the technology and derives the stability conditions to be verified by the driver block and the adaptive mechanism of the optimized adaptive controller to guaranty the desired control performance. The second and third parts present strategic considerations of predictive control and related adaptive systems necessary for the proper design of driver block and adaptive mechanism and thence their technical realization. The authors then proceed to detail the stability theory that supports predictive, adaptive predictive and optimized adaptive control methodologies. Benchmark applications of these methodologies (distillation column and pulp-factory bleaching plant) are treated next with a focus on practical implementation issues. The final part of the book describes ADEX platforms and illustrates their use in the design and implementation of optimized adaptive control systems to three different challenging-to-control industrial processes: waste-water treatment; sulfur recovery; and temperature control of superheated steam in coal-fired power generation. The presentation is completed by a number of appendices containing technical background associated with the main text including a manual for the ADEX COP platform developed by the first author to exploit the capabilities of adaptive predictive control in real plants. ADEX Optimized Adaptive Control Systems provides practicing process control engineers with a multivariable optimal control solution which is adaptive and resistant to perturbation and the effects of noise. Its pedagogical features also facilitate its use as a teaching tool for formal university and Internet-based open-education-type graduate courses in practical optimal adaptive control and for self-study.

This textbook provides a tutorial introduction to behavioral applications of control theory. Control theory describes the information one should be sensitive to and the pattern of influence that one should exert on a dynamic system in order to achieve a goal. As such, it is applicable to various forms of dynamic behavior. The book primarily deals with manual control (e.g., moving the cursor on a computer screen, lifting an object, hitting a ball, driving a car), both as a substantive area of study and as a useful perspective for approaching control theory. It is the experience of the authors that by imagining themselves as part of a manual control system, students are better able to learn numerous concepts in this field. Topics include varieties of control theory, such as classical, optimal, fuzzy, adaptive, and learning control, as well as perception and decision making in dynamic contexts. The authors also discuss implications of control theory for how experiments can be conducted in the behavioral sciences. In each of these areas they have provided brief essays intended to convey key concepts that enable the reader to more easily pursue additional readings. Behavioral scientists teaching control courses will be very interested in this book.

A practical methodology for designing integrated automation control for systems and processes Implementing digital control within mechanical-electronic (mechatronic) systems is essential to respond to the growing demand for high-efficiency machines and processes. In practice, the most efficient digital control often integrates time-driven and event-driven characteristics within a single control scheme. However, most of the current engineering literature on the design of digital control systems presents discrete-time systems and discrete-event systems separately. Control Of Mechatronic Systems: Model-Driven Design And Implementation Guidelines unites the two systems, revisiting the concept of automated control by presenting a unique practical methodology for whole-system integration. With its innovative hybrid approach to the modeling, analysis, and design of control systems, this text provides material for mechatronic engineering and process automation courses, as well as for self-study across engineering disciplines. Real-life design problems and automation case studies help readers transfer theory to practice, whether they are building single machines or large-scale industrial systems. Presents a novel approach to the integration of discrete-time and discrete-event systems within mechatronic systems and industrial processes Offers user-friendly self-study units, with worked examples and numerous real-world exercises in each chapter Covers a range of engineering disciplines and applies to small- and large-scale systems, for broad appeal in research and practice Provides a firm theoretical foundation allowing readers to comprehend the underlying technologies of mechatronic systems and processes Control Of Mechatronic Systems is an important text for advanced students and professionals of all levels engaged in a broad range of engineering disciplines.

This book introduces a comprehensive methodology for adaptive control design of parabolic partial differential equations with unknown functional parameters, including reaction-convection-diffusion systems ubiquitous in chemical, thermal, biomedical, aerospace, and energy systems. Andrey Smyshlyaev and Miroslav Krstic develop explicit feedback laws that do not require real-time solution of Riccati or other algebraic operator-valued equations. The book emphasizes stabilization by boundary control and using boundary sensing for unstable PDE systems with an infinite relative degree. The book also presents a rich collection of methods for system identification of PDEs, methods that employ Lyapunov, passivity, observer-based, swapping-based, gradient, and least-squares tools and parameterizations, among others. Including a wealth of stimulating ideas and providing the mathematical and control-systems background needed to follow the designs and proofs, the book will be of great use to students and researchers in mathematics, engineering, and physics. It also makes a valuable supplemental text for graduate courses on distributed parameter systems and adaptive control.

A systematic and unified presentation of the fundamentals of adaptive control theory in both continuous time and discrete time Today, adaptive control theory has grown to be a rigorous and mature discipline. As the advantages of adaptive systems for developing advanced applications grow apparent, adaptive control is becoming more popular in many fields of engineering and science. Using a simple, balanced, and harmonious style, this book provides a convenient introduction to the subject and improves one's understanding of adaptive control theory. Adaptive Control Design and Analysis features: Introduction to systems and control Stability, operator norms, and signal convergence Adaptive parameter estimation State feedback adaptive control designs Parametrization of state observers for adaptive control Unified continuous and discrete-time adaptive control L1+a robustness theory for adaptive systems Direct and indirect adaptive control designs Benchmark comparison study of adaptive control designs Multivariate adaptive control Nonlinear adaptive control Adaptive compensation of actuator nonlinearities End-of-chapter discussion, problems, and advanced topics As either a textbook or reference, this self-contained tutorial of adaptive control design and analysis is ideal for practicing engineers, researchers, and graduate students alike.

The essential introduction to the principles and applications of feedback systems—now fully revised and expanded This textbook covers the mathematics needed to model, analyze, and design feedback systems. Now more user-friendly than ever, this revised and expanded edition of Feedback Systems is a one-volume resource for students and researchers in mathematics and engineering. It has applications across a range of disciplines that utilize feedback in physical, biological, information, and economic systems. Karl Åström and Richard Murray use techniques from physics, computer science, and operations research to introduce control-oriented modeling. They begin with state space tools for analysis and design, including stability of solutions, Lyapunov functions, reachability, state feedback observability, and estimators. The matrix exponential plays a central role in the analysis of linear control systems, allowing a concise development of many of the key concepts for this class of models. Åström and Murray then develop and explain tools in the frequency domain, including transfer functions, Nyquist analysis, PID control, frequency domain design, and robustness. Features a new chapter on design principles and tools, illustrating the types of problems that can be solved using feedback Includes a new chapter on fundamental limits and new material on the Routh-Hurwitz criterion and root locus plots Provides exercises at the end of every chapter Comes with an electronic solutions manual An ideal textbook for undergraduate and graduate students Indispensable for researchers seeking a self-contained resource on control theory

Robust and Adaptive Control shows the reader how to produce consistent and accurate controllers that operate in the presence of uncertainties and unforeseen events. Driven by aerospace applications the focus of the book is primarily on continuous-dynamical systems. The text is a three-part treatment, beginning with robust and optimal linear control methods and moving on to a self-contained presentation of the design and analysis of model reference adaptive control (MRAC) for nonlinear uncertain dynamical systems. Recent extensions and modifications to MRAC design are included, as are guidelines for combining robust optimal and MRAC controllers. Features of the text include: · case studies that demonstrate the benefits of robust and adaptive control for piloted, autonomous and experimental aerial platforms; · detailed background material for each chapter to motivate theoretical developments; · realistic examples and simulation data illustrating key features of the methods described; and · problem solutions for instructors and MATLAB® code provided electronically. The theoretical content and practical applications reported address real-life aerospace problems, being based on numerous transitions of control-theoretic results into operational systems and airborne vehicles that are drawn from the authors' extensive professional experience with The Boeing Company. The systems covered are challenging, often open-loop unstable, with uncertainties in their dynamics, and thus requiring both persistently reliable control and the ability to track commands either from a pilot or a guidance computer. Readers are assumed to have a basic understanding of root locus, Bode diagrams, and Nyquist plots, as well as linear algebra, ordinary differential equations, and the use of state-space methods in analysis and modeling of dynamical systems. Robust and Adaptive Control is intended to methodically teach senior undergraduate and graduate students how to construct stable and predictable control algorithms for realistic industrial applications. Practicing engineers and academic researchers will also find the book of great instructional value.

This volume surveys the major results and techniques of analysis in the field of adaptive control. Focusing on linear, continuous time, single-input, single-output systems, the authors offer a clear, conceptual presentation of adaptive methods, enabling a critical evaluation of these techniques and suggesting avenues of further development. 1989 edition.

Teaches students about classical and nonclassical adaptive systems within one pair of covers Helps tutors with time-saving course plans, ready-made practical assignments and examination guidance The recently developed "practical sub-space adaptive filter" allows the reader to combine any set of classical and/or non-classical adaptive systems to form a powerful technology for solving complex nonlinear problems

"Illustrates the analysis, behavior, and design of linear control systems using classical, modern, and advanced control techniques. Covers recent methods in system identification and optimal, digital, adaptive, robust, and fuzzy control, as well as stability, controllability, observability, pole placement, state observers, input-output decoupling, and model matching."

Suitable for advanced undergraduates and graduate students, this overview introduces theoretical and practical aspects of adaptive control, with emphasis on deterministic and stochastic viewpoints. 1995 edition.

This 3rd edition provides chemical engineers with process control techniques that are used in practice while offering detailed mathematical analysis. Numerous examples and simulations are used to illustrate key theoretical concepts. New exercises are integrated throughout several chapters to reinforce concepts.

This book presents the results of the second workshop on Neural Adaptive Control Technology, NACT II, held on September 9-10, 1996, in Berlin. The workshop was organised in connection with a three-year European-Union-funded Basic Research Project in the ESPRIT framework, called NACT, a collaboration between Daimler-Benz (Germany) and the University of Glasgow (Scotland).The NACT project, which began on 1 April 1994, is a study of the fundamental properties of neural-network-based adaptive control systems. Where possible, links with traditional adaptive control systems are exploited. A major aim is to develop a systematic engineering procedure for designing neural controllers for nonlinear dynamic systems. The techniques developed are being evaluated on concrete industrial problems from within the Daimler-Benz group of companies.The aim of the workshop was to bring together selected invited specialists in the fields of adaptive control, nonlinear systems and neural networks. The first workshop (NACT I) took place in Glasgow in May 1995 and was mainly devoted to theoretical issues of neural adaptive control. Besides monitoring further development of theory, the NACT II workshop was focused on industrial applications and software tools. This context dictated the focus of the book and guided the editors in the choice of the papers and their subsequent reshaping into substantive book chapters. Thus, with the project having progressed into its applications stage, emphasis is put on the transfer of theory of neural adaptive engineering into industrial practice. The contributors are therefore both renowned academics and practitioners from major industrial users of neurocontrol.

Adaptive filtering is a topic of immense practical and theoretical value, having applications in areas ranging from digital and wireless communications to biomedical systems. This book enables readers to gain a gradual and solid introduction to the subject, its applications to a variety of topical problems, existing limitations, and extensions of current theories. The book consists of eleven parts?each part containing a series of focused lectures and ending with bibliographic comments, problems, and computer projects with MATLAB solutions.

Adaptive Control (second edition) shows how a desired level of system performance can be maintained automatically and in real time, even when process or disturbance parameters are unknown and variable. It is a coherent exposition of the many aspects of this field, setting out the problems to be addressed and moving on to solutions, their practical significance and their application. Discrete-time aspects of adaptive control are emphasized to reflect the importance of digital computers in the application of the ideas presented. The second edition is thoroughly revised to throw light on recent developments in theory and applications with new chapters on: multimodel adaptive control with switching, direct and indirect adaptive regulation and adaptive feedforward disturbance compensation. Many algorithms are newly presented in MATLAB® m-file format to facilitate their employment in real systems. Classroom-tested slides for instructors to use in teaching this material are also now provided. All of this supplementary electronic material can be downloaded from fill in URL. The core material is also up-dated and re-edited to keep its perspective in line with modern ideas and more closely to associate algorithms with their applications giving the reader a solid grounding in: synthesis and analysis of parameter adaptation algorithms, recursive plant model identification in open and closed loop, robust digital control for adaptive control; • robust parameter adaptation algorithms, practical considerations and applications, including flexible transmission systems, active vibration control and broadband disturbance rejection and a supplementary introduction on hot dip galvanizing and a phosphate drying furnace. Control researchers and applied mathematicians will find Adaptive Control of significant and enduring interest and its use of example and application will appeal to practitioners working with unknown- and variable-parameter plant. Praise for the first edition: ...well written, interesting and easy to follow, so that it constitutes a valuable addition to the monographies in adaptive control for discrete-time linear systems... suitable (at least in part) for use in graduate courses in adaptive control.

This open access Brief introduces the basic principles of control theory in a concise self-study guide. It complements the classic texts by emphasizing the simple conceptual unity of the subject. A novice can quickly see how and why the different parts fit together. The concepts build slowly and naturally one after another, until the reader soon has a view of the whole. Each concept is illustrated by detailed examples and graphics. The full software code for each example is available, providing the basis for experimenting with various assumptions, learning how to write programs for control analysis, and setting the stage for future research projects. The topics focus on robustness, design trade-offs, and optimality. Most of the book develops classical linear theory. The last part of the book considers robustness with respect to nonlinearity and explicitly nonlinear extensions, as well as advanced topics such as adaptive control and model predictive control. New students, as well as scientists from other backgrounds who want a concise and easy-to-grasp coverage of control theory, will benefit from the emphasis on concepts and broad understanding of the various approaches.

This second edition of Adaptive Filters: Theory andApplications has been updated throughout to reflect the latestdevelopments in this field; notably an increased coverage given tothe practical applications of the theory to illustrate the muchbroader range of adaptive filters applications developed in recentyears. The book offers an easy to understand approach to the theoryand application of adaptive filters by clearly illustrating how thetheory explained in the early chapters of the book is modified forthe various applications discussed in detail in later chapters.This integrated approach makes the book a valuable resource forgraduate students; and the inclusion of more advanced applicationsincluding antenna arrays and wireless communications makes it asuitable technical reference for engineers, practitioners andresearchers. Key features: • Offers a thorough treatment of the theory of adaptivesignal processing; incorporating new material on transform domain,frequency domain, subband adaptive filters, acoustic echocancellation and active noise control. • Provides an in-depth study of applications which nowincludes extensive coverage of OFDM, MIMO and smart antennas. • Contains exercises and computer simulation problems atthe end of each chapter. • Includes a new companion website hosting MATLAB®simulation programs which complement the theoretical analyses,enabling the reader to gain an in-depth understanding of thebehaviours and properties of the various adaptive algorithms.

This graduate-level text offers a thorough understanding of the global stability properties essential to designing adaptive systems. Its self-contained, unified presentation includes detailed case studies and numerous problems. 1989 edition.

In this work, the authors present a global perspective on the methods available for analysis and design of non-linear control systems and detail specific applications. They provide a tutorial exposition of the major non-linear systems analysis techniques followed by a discussion of available non-linear design methods.

Presents reports on recent industrial applications, experiences and advances in the use of adaptive and self-tuning control in chemical and related processes. Material covered includes new, practically orientated adaptive control algorithms as well as the control of various chemical plants such as distillation columns, chemical reactors, drying and bleaching plants, plastic extruders and wastewater neutralization plants. Contains 34 papers.

Adaptive ControlSecond EditionCourier Corporation

Diskette includes: MATLAB programs and exercises.

Modern Control Systems, 12e, is ideal for an introductory undergraduate course in control systems for engineering students. Written to be equally useful for all engineering disciplines, this text is organized around the concept of control systems theory as it has been developed in the frequency and time domains. It provides coverage of classical control, employing root locus design, frequency and response design using Bode and Nyquist plots. It also covers modern control methods based on state variable models including pole placement design techniques with full-state feedback controllers and full-state observers. Many examples throughout give students ample opportunity to apply the theory to the design and analysis of control systems. Incorporates computer-aided design and analysis using MATLAB and LabVIEW MathScript.

Includes a solution manual for problems. Provides MATLAB code for examples and solutions. Deals with robust systems in both theory and practice.

This volume features computational tools that can be applied directly and are explained with simple calculations, plus an emphasis on control system principles and ideas. Includes worked examples, MATLAB macros, and solutions manual.

Leading experts present the latest research results in adaptive signal processing Recent developments in signal processing have made it clear that significant performance gains can be achieved beyond those achievable using standard adaptive filtering approaches. Adaptive Signal Processing presents the next generation of algorithms that will produce these desired results, with an emphasis on important applications and theoretical advancements. This highly unique resource brings together leading authorities in the field writing on the key topics of significance, each at the cutting edge of its own area of specialty. It begins by addressing the problem of optimization in the complex domain, fully developing a framework that enables taking full advantage of the power of complex-valued processing. Then, the challenges of multichannel processing of complex-valued signals are explored. This comprehensive volume goes on to cover Turbo processing, tracking in the subspace domain, nonlinear sequential state estimation, and speech-bandwidth extension. Examines the seven most important topics in adaptive filtering that will define the next-generation adaptive filtering solutions Introduces the powerful adaptive signal processing methods developed within the last ten years to account for the characteristics of real-life data: non-Gaussianity, non-circularity, non-stationarity, and non-linearity Features self-contained chapters, numerous examples to clarify concepts, and end-of-chapter problems to reinforce understanding of the material Contains contributions from acknowledged leaders in the field Adaptive Signal Processing is an invaluable tool for graduate students, researchers, and practitioners working in the areas of signal processing, communications, controls, radar, sonar, and biomedical engineering.

This authoritative volume on statistical and adaptive signal processing offers you a unified, comprehensive and practical treatment of spectral estimation, signal modeling, adaptive filtering, and array processing. Packed with over 3,000 equations and more than 300 illustrations, this unique resource provides you with balanced coverage of implementation issues, applications, and theory, making it a smart choice for professional engineers and students alike.

This textbook provides readers with a good working knowledge of adaptive control theory through applications. It is intended for students beginning masters or doctoral courses, and control practitioners wishing to get up to speed in the subject expeditiously. Readers are taught a wide variety of adaptive control techniques starting with simple methods and extending step-by-step to more complex ones. Stability proofs are provided for all adaptive control techniques without obfuscating reader understanding with excessive mathematics. The book begins with standard model-reference adaptive control (MRAC) for first-order, second-order, and multi-input, multi-output systems. Treatment of least-squares parameter estimation and its extension to MRAC follow, helping readers to gain a different perspective on MRAC. Function approximation with orthogonal polynomials and neural networks, and MRAC using neural networks are also covered. Robustness issues connected with MRAC are discussed, helping the student to appreciate potential pitfalls of the technique. This appreciation is encouraged by drawing parallels between various aspects of robustness and linear time-invariant systems wherever relevant. Following on from the robustness problems is material covering robust adaptive control including standard methods and detailed exposition of recent advances, in particular, the author's work on optimal control modification. Interesting properties of the new method are illustrated in the design of adaptive systems to meet stability margins. This method has been successfully flight-tested on research aircraft, one of various flight-control applications detailed towards the end of the book along with a hybrid adaptive flight control architecture that combines direct MRAC with least-squares indirect adaptive control. In addition to the applications, understanding is encouraged by the use of end-of-chapter exercises and associated MATLAB® files. Readers will need no more than the standard mathematics for basic control theory such as differential equations and matrix algebra; the book covers the foundations of MRAC and the necessary mathematical preliminaries.

impossible to access. It has been widely scattered in papers, reports, and proceedings ofsymposia, with different authors employing different symbols and terms. But now thereis a book that covers all aspects of this dynamic topic in a systematic manner.Featuring consistent terminology and compatible notation, and emphasizing unifiedstrategies, Adaptive Control Systems provides a comprehensive, integrated accountof basic concepts, analytical tools, algorithms, and a wide variety of application trendsand techniques.Adaptive Control Systems deals not only with the two principal approachesmodelreference adaptive control and self-tuning regulators-but also considers otheradaptive strategies involving variable structure systems, reduced order schemes, predictivecontrol, fuzzy logic, and more. In addition, it highlights a large number of practical applicationsin a range of fields from electrical to biomedical and aerospace engineering ...and includes coverage of industrial robots.The book identifies current trends in the development of adaptive control systems ...delineates areas for further research . : . and provides an invaluable bibliography of over1,200 references to the literature.The first authoritative reference in this important area of work, Adaptive ControlSystems is an essential information source for electrical and electronics, R&D,chemical, mechanical, aerospace, biomedical, metallurgical, marine, transportation, andpower plant engineers. It is also useful as a text in professional society seminars and inhousetraining programs for personnel involved with the control of complex systems, andfor graduate students engaged in the study of adaptive control systems.

Designed to meet the needs of a wide audience without sacrificing mathematical depth and rigor, Adaptive Control Tutorial presents the design, analysis, and application of a wide variety of algorithms that can be used to manage dynamical systems with unknown parameters. Its tutorial-style presentation of the fundamental techniques and algorithms in adaptive control make it suitable as a textbook. Adaptive Control Tutorial is designed to serve the needs of three distinct groups of readers: engineers and students interested in learning how to design, simulate, and implement parameter estimators and adaptive control schemes without having to fully understand the analytical and technical proofs; graduate students who, in addition to attaining the aforementioned objectives, also want to understand the analysis of simple schemes and get an idea of the steps involved in more complex proofs; and advanced students and researchers who want to study and understand the details of long and technical proofs with an eye toward pursuing research in adaptive control or related topics. The authors achieve these multiple objectives by enriching the book with examples demonstrating the design procedures and basic analysis steps and by detailing their proofs in both an appendix and electronically available supplementary material; online examples are also available. A solution manual for instructors can be obtained by contacting SIAM or the authors. Preface; Acknowledgements; List of Acronyms; Chapter 1: Introduction; Chapter 2: Parametric Models; Chapter 3: Parameter Identification: Continuous Time; Chapter 4: Parameter Identification: Discrete Time; Chapter 5: Continuous-Time Model Reference Adaptive Control; Chapter 6: Continuous-Time Adaptive Pole Placement Control; Chapter 7: Adaptive Control for Discrete-Time Systems; Chapter 8: Adaptive Control of Nonlinear Systems; Appendix; Bibliography; Index

Based on the successful Modelling and Control of Robot Manipulators by Sciavicco and Siciliano (Springer, 2000), Robotics provides the basic know-how on the foundations of robotics: modelling, planning and control. It has been expanded to include coverage of mobile robots, visual control and motion planning. A variety of problems is raised throughout, and the proper tools to find engineering-oriented solutions are introduced and explained. The text includes coverage of fundamental topics like kinematics, and trajectory planning and related technological aspects including actuators and sensors. To impart practical skill, examples and case studies are carefully worked out and interwoven through the text, with frequent resort to simulation. In addition, end-of-chapter exercises are proposed, and the book is accompanied by an electronic solutions manual containing the MATLAB® code for computer problems; this is available free of charge to those adopting this volume as a textbook for courses.

Computer Aided Design of Control Systems focuses on the use of computers to analyze and design the control of various processes, as well as the development of program packages with different algorithms for digital computers. The selection first takes a look at the computer aided design of minimal order controllers, including design of interacting and noninteracting dynamic controllers of minimal order and basic algorithm. The book then discusses an accelerated Newton process to solve Riccati equation through matrix sign function; suboptimal direct digital control of a trickle-bed absorption column; and structural design of large systems employing a geometric approach. The text underscores the computer as an aid for the implementation of advanced control algorithms on physical processes and analysis of direct control algorithms and their parallel realization. Topics include hardware influences on the control, process influence, and interactive structure design of direct control systems. The book also takes a look at the optimal control of randomly sampled linear stochastic systems; computer aided design of suboptimal test signals for system identification; and computer aided design of multi-level systems with prescribed structure and control constraints. The selection is a dependable source of data for readers interested in the uses of computers.

This graduate-level text focuses on the stability of adaptive systems, and offers a thorough understanding of the global stability properties essential to designing adaptive systems. Its self-contained, unified presentation of well-known results establishes the close connections between seemingly independent developments in the field. Prerequisites include a knowledge of linear algebra and differential equations, as well as a familiarity with basic concepts in linear systems theory. The first chapter sets the tone for the entire book, introducing basic concepts and tracing the evolution of the field from the 1960s through the 1980s. The first seven chapters are accessible to beginners, and the final four chapters are geared toward more advanced, research-oriented students. Problems ranging in complexity from relatively easy to quite difficult appear throughout the text. Topics include results in stability theory that emphasize incidents directly relevant to the study of adaptive systems; the stability properties of adaptive observers and controllers; the important concept of persistent excitation; the use of error models in systems analysis; areas of intense research activity; and five detailed case studies of systems in which adaptive control has proved successful

Presented in a tutorial style, this comprehensive treatment unifies, simplifies, and explains most of the techniques for designing and analyzing adaptive control systems. Numerous examples clarify procedures and methods. 1995 edition.