Iterative Learning Control Analysis Design Integration And Applications

An easily implementable feedback version is created to optimize the same cost every time step from the current measured position. An ILC algorithm is also created to iteratively learn to give local zero error in the real world while using an imperfect model. This approach also gives a method to apply ILC to endpoint problem without specifying an arbitrary trajectory to follow to reach the endpoint. This creates a method for ILC to apply to such problems without asking for accurate tracking of a somewhat arbitrary trajectory to accomplish learning to reach the desired endpoint. The last chapter outlines a set of uses for a stable inverse in control applications, including Linear Model Predictive Control (LMPC), and LMPC applied to Repetitive Control (RC-LMPC), and a generalized form of a one-step ahead control. An important characteristic is that this approach has the property of converging to zero tracking error in a small number of time steps, which is finite time convergence instead of asymptotic convergence as time tends to infinity.

This book belongs to the subject of control and systems theory. It studies a novel data-driven framework for the design and analysis of iterative learning control (ILC) for nonlinear discrete-time systems. A series of iterative dynamic linearization methods is discussed firstly to build a linear data mapping with respect of the system's output and input between two consecutive iterations. On this basis, this work presents a series of data-driven ILC (DDILC) approaches with rigorous analysis. After that, this work also conducts significant extensions to the cases with incomplete data information, specified point tracking, higher order law, system constraint, nonrepetitive uncertainty, and event-triggered strategy to facilitate the real applications. The readers can learn the recent progress on DDILC for complex systems in practical applications. This book is intended for academic scholars, engineers, and graduate students who are interested in learning control, adaptive control, nonlinear systems, and related fields.

The field of soft computing is emerging from the cutting edge research over the last ten years devoted to fuzzy engineering and genetic algorithms. The subject is being called soft computing and computational intelligence. With acceptance of the research fundamentals in these important areas, the field is expanding into direct applications through engineering and systems science. This book cover the fundamentals of this emerging filed, as well as direct applications and case studies. There is a need for practicing engineers, computer scientists, and system scientists to directly apply "fuzzy" engineering into a wide array of devices and systems.

This proceedings volume gathers a selection of papers presented at the Fifth International Conference on High Performance Scientific Computing, which took place in Hanoi on March 5-9, 2012. The conference was organized by the Institute of Mathematics of the Vietnam Academy of Science and Technology (VAST), the Interdisciplinary Center for Scientific Computing (IWR) of Heidelberg University, Ho Chi Minh City University of Technology, and the Vietnam Institute for Advanced Study in Mathematics. The contributions cover the broad interdisciplinary spectrum of scientific computing and present recent advances in theory, development of methods, and practical applications. Subjects covered include mathematical modeling; numerical simulation; methods for optimization and control; parallel computing; software development; and applications of scientific computing in physics, mechanics and biomechanics, material science, hydrology, chemistry, biology, biotechnology, medicine, sports, psychology, transport, logistics, communication networks, scheduling, industry, business and finance.

Analysis, Design, Integration and Applications

16th International Conference, ICAISC 2017, Zakopane, Poland, June 11-15, 2017, Proceedings, Part II

Design and Applications

Modeling, Simulation and Optimization of Complex Processes - HPSC 2012

Synthesis and Analysis of Design Methods in Linear Repetitive, Iterative Learning and Model Predictive Control

The Control Handbook (three volume set)

Model-Based Control will be a collection of state-of-the-art contributions in the field of modelling, identification, robust control and optimization of dynamical systems, with particular attention to the application domains of motion control systems (high-accuracy positioning systems) and large scale industrial process control systems.The book will be directed to academic and industrial people involved in research in systems and control, industrial process control and mechatronics.

This book presents an in-depth discussion of iterative learning control (ILC) with passive incomplete information, highlighting the incomplete input and output data resulting from practical factors such as data dropout, transmission disorder, communication delay, etc.—a cutting-edge topic in connection with the practical applications of ILC. It describes in detail three data dropout models: the random sequence model, Bernoulli variable model, and Markov chain model—for both linear and nonlinear stochastic systems. Further, it proposes and analyzes two major compensation algorithms for the incomplete data, namely, the intermittent update algorithm and successive update algorithm. Incomplete information environments include random data dropout, random communication delay, random iteration-varying lengths, and other communication constraints. With numerous intuitive figures to make the content more accessible, the book explores several potential solutions to this topic, ensuring that readers are not only introduced to the latest advances in ILC for systems with random factors, but also gain an in-depth understanding of the intrinsic relationship between incomplete information environments and essential tracking performance. It is a valuable resource for academics and engineers, as well as graduate students who are interested in learning about control, data-driven control, networked control systems, and related fields.

Real-time Iterative Learning Control demonstrates how the latest advances in iterative learning control (ILC) can be applied to a number of plants widely encountered in practice. The book gives a systematic introduction to real-time ILC design and source of illustrative case studies for ILC problem solving; the fundamental concepts, schematics, configurations and generic guidelines for ILC design and implementation are enhanced by a well-selected group of representative, simple and easy-to-learn example applications. Key issues in ILC design and implementation in linear and nonlinear plants pervading mechatronics and batch processes are addressed, in particular: ILC design in the continuous- and discrete-time domains; design in the frequency and time domains; design with problem-specific performance objectives including robustness and optimality; design in a modular approach by integration with other control techniques; and design by means of classical tools based on Bode plots and state space.

Using important examples, this book showcases the potential of the latest data-based and data-driven methodologies for filter and control design. It discusses the most important classes of dynamic systems, along with the statistical and set membership analysis and design frameworks.

Motion and Vibration Control

Intelligent Technologies and Engineering Systems

Advances in Automation, Signal Processing, Instrumentation, and Control

Practical Iterative Learning Control with Frequency Domain Design and Sampled Data Implementation

Data-Driven Iterative Learning Control for Discrete-Time Systems

Linear and Nonlinear Iterative Learning Control

This monograph summarizes the recent achievements made in the field of iterative learning control. The book is self-contained in theoretical analysis and can be used as a reference or textbook for a graduate level course as well as for self-study. It opens a new avenue towards a new paradigm in deterministic learning control theory accompanied by detailed examples.

Iterative Learning Control (ILC) differs from most existing control methods in the sense that, it exploits every possibility to incorporate past control informa tion, such as tracking errors and control input signals, into the construction of the present control action. There are two phases in Iterative Learning Control: first the long term memory components are used to store past control infor mation, then the stored control information is fused in a certain manner so as to ensure that the system meets control specifications such as convergence, robustness, etc. It is worth pointing out that, those control specifications may not be easily satisfied by other control methods as they require more prior knowledge of the process in the stage of the controller design. ILC requires much less information of the system variations to yield the desired dynamic be haviors. Due to its simplicity and effectiveness, ILC has received considerable attention and applications in many areas for the past one and half decades. Most contributions have been focused on developing new ILC algorithms with property analysis. Since 1992, the research in ILC has progressed by leaps and bounds. On one hand, substantial work has been conducted and reported in the core area of developing and analyzing new ILC algorithms. On the other hand, researchers have realized that integration of ILC with other control techniques may give rise to better controllers that exhibit desired performance which is impossible by any individual approach.

The two-volume set LNAI 10245 and LNAI 10246 constitutes the refereed proceedings of the 16th International Conference on Artificial Intelligence and Soft Computing, ICAISC 2017, held in Zakopane, Poland in June 2017. The 133 revised full papers presented were carefully reviewed and selected from 274 submissions. The papers included in the second volume are organized in the following five parts: data mining; artificial intelligence in modeling, simulation and control; various problems of artificial intelligence; special session: advances in single-objective continuous parameter optimization with nature-inspired algorithms; special session: stream data mining.

Run-to-run (R2R) control is cutting-edge technology that allows modification of a product recipe between machine "runs," thereby minimizing process drift, shift, and variability-and with them, costs. Its effectiveness has been demonstrated in a variety of processes, such as vapor phase epitaxy,

lithography, and chemical mechanical planarization. The only barrier to the semiconductor industry's widespread adoption of this highly effective process control is a lack of understanding of the technology. Run to Run Control in Semiconductor Manufacturing overcomes that barrier by offering in-depth analyses of R2R control.

CONTROL SYSTEMS, ROBOTICS AND AUTOMATION – Volume X

Trends in Advanced Intelligent Control, Optimization and Automation

Discrete-Time Adaptive Iterative Learning Control

Methods and Applications

Iterative Learning Control for Deterministic Systems

Recent Advances in Learning and Control

This book is based on the authors' research on the stabilization and fault-tolerant control of batch processes, which are flourishing topics in the field of control system engineering. It introduces iterative learning control for linear/nonlinear single/multi-phase batch processes; iterative learning optimal guaranteed cost control; delay-dependent iterative learning control; and iterative learning fault-tolerant control for linear/nonlinear single/multi-phase batch processes. Providing important insights and useful methods and practical algorithms that can potentially be applied in batch process control and optimization, it is a valuable resource for researchers, scientists, and engineers in the field of process system engineering and control engineering.

This book develops a coherent and quite general theoretical approach to algorithm design for iterative learning control based on the use of operator representations and quadratic optimization concepts including the related ideas of inverse model control and gradient-based design. Using detailed examples taken from linear, discrete and continuous-time systems, the author gives the reader access to theories based on either signal or parameter optimization. Although the two approaches are shown to be related in a formal mathematical sense, the text presents them separately as their relevant algorithm design issues are distinct and give rise to different performance capabilities. Together with algorithm design, the text demonstrates the underlying robustness of the paradigm and also includes new control laws that are capable of incorporating input and output constraints, enable the algorithm to reconfigure systematically in order to meet the requirements of different reference and auxiliary signals and also to support new properties such as spectral annihilation. Iterative Learning Control will interest academics and graduate students working in control who will find it a useful reference to the current status of a powerful and increasingly popular method of control. The depth of background theory and links to practical systems will be of use to engineers responsible for precision repetitive processes.

This book presents an in-depth discussion of iterative learning control (ILC) with passive incomplete information, highlighting the incomplete input and output data resulting from practical factors such as data dropout, transmission disorder, communication delay, etc.--a cutting-edge topic in connection with the practical applications of ILC. It describes in detail three data dropout models: the random sequence model, Bernoulli variable model, and Markov chain model--for both linear and nonlinear stochastic systems. Further, it proposes and analyzes two major compensation algorithms for the incomplete data, namely, the intermittent update algorithm and successive update algorithm. Incomplete information environments include random data dropout, random communication delay, random iteration-varying lengths, and other communication constraints. With numerous intuitive figures to make the content more accessible, the book explores several potential solutions to this topic, ensuring that readers are not only introduced to the latest advances in ILC for systems with random factors, but also gain an in-depth understanding of the intrinsic relationship between incomplete information environments and essential tracking performance. It is a valuable resource for academics and engineers, as well as graduate students who are interested in learning about control, data-driven control, networked control systems, and related fields.

Motion and vibration control is a fundamental technology for the development of advanced mechanical systems such as mechatronics, vehicle systems, robots, spacecraft, and rotating machinery. Often the implementation of high performance, low power consumption designs is only possible with the use of this technology. It is also vital to the mitigation of natural hazards for large

structures such as high-rise buildings and tall bridges, and to the application of flexible structures such as space stations and satellites. Recent innovations in relevant hardware, sensors, actuators, and software have facilitated new research in this area. This book deals with the interdisciplinary aspects of emerging technologies of motion and vibration control for mechanical, civil and aerospace systems. It covers a broad range of applications (e.g. vehicle dynamics, actuators, rotor dynamics, biologically inspired mechanics, humanoid robot dynamics and control, etc.) and also provides advances in the field of fundamental research e.g. control of fluid/structure integration, nonlinear control theory, etc. Each of the contributors is a recognised specialist in his field, and this gives the book relevance and authority in a wide range of areas.

Bridging Rigorous Theory and Advanced Technology

From Model-Based to Data-Driven

Advanced Control Systems-IV

Real-time Iterative Learning Control

Analysis, Design, and Experiments

Iterative Learning Control with Passive Incomplete Information

This book concentrates on intelligent technologies as it relates to engineering systems. The book covers the following topics: networking, signal processing, artificial intelligence, control and software engineering, intelligent electronic circuits and systems, communications, and materials and mechanical engineering. The book is a collection of original papers that have been reviewed by technical editors. These papers were presented at the International Conference on Intelligent Technologies and Engineering Systems, held Dec. 13-15, 2012.

At publication, The Control Handbook immediately became the definitive resource that engineers working with modern control systems required. Among its many accolades, that first edition was cited by the AAP as the Best Engineering Handbook of 1996. Now, 15 years later, William Levine has once again compiled the most comprehensive and authoritative resource on control engineering. He has fully reorganized the text to reflect the technical advances achieved since the last edition and has expanded its contents to include the multidisciplinary perspective that is making control engineering a critical component in so many fields. Now expanded from one to three volumes, The Control Handbook, Second Edition organizes cutting-edge contributions from more than 200 leading experts. The third volume, Control System Advanced Methods, includes design and analysis methods for MIMO linear and LTI systems, Kalman filters and observers, hybrid systems, and nonlinear systems. It also covers advanced considerations regarding — Stability Adaptive controls System identification Stochastic control Control of distributed parameter systems Networks and networked controls As with the first edition, the new edition not only stands as a record of accomplishment in control engineering but provides researchers with the means to make further advances. Progressively organized, the first two volumes in the set include: Control System Fundamentals Control System Applications

This book belongs to the subject of control and systems theory. The discrete-time adaptive iterative learning control (DAILC) is discussed as a cutting-edge of ILC and can address random initial states, iteration-varying targets, and other non-repetitive uncertainties in practical applications. This book begins with the design and analysis of model-based DAILC methods by referencing the tools used in the discrete-time adaptive control theory. To overcome the extreme difficulties in modeling a complex system, the data-driven DAILC methods are further discussed by building a linear parametric data mapping between two consecutive iterations. Other significant improvements and extensions of the model-based/data-driven DAILC are also studied to facilitate broader applications. The readers can learn the recent progress on DAILC with consideration of various applications. This book is intended for academic scholars, engineers and graduate students who are interested in learning control, adaptive control, nonlinear systems, and related fields.

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.

Artificial Intelligence and Soft Computing

Data-Driven Modeling, Filtering and Control

Control System Advanced Methods, Second Edition

Selected Papers from MOVIC 2008

Iterative Learning Control for Multi-agent Systems Coordination

Select Proceedings of i-CASIC 2020

At publication, The Control Handbook immediately became the definitive resource that engineers working with modern control systems required. Among its many accolades, that first edition was cited by the AAP as the Best Engineering Handbook of 1996. Now, 15 years later, William Levine has once again compiled the most comprehensive and authoritative resource on control engineering. He has fully reorganized the text to reflect the technical advances achieved since the last edition and has expanded its contents to include the multidisciplinary perspective that is making control engineering a critical component in so many fields. Now expanded from one to three volumes, The Control Handbook, Second Edition brilliantly organizes cutting-edge contributions from more than 200 leading experts representing every corner of the globe. They cover everything from basic closed-loop systems to multi-agent adaptive systems and from the control of electric motors to the control of complex networks. Progressively organized, the three volume set includes: Control System Fundamentals Control System Applications Control System Advanced Methods Any practicing engineer, student, or researcher working in fields as diverse as electronics, aeronautics, or biomedicine will find this handbook to be a time-saving resource filled with invaluable formulas, models, methods, and innovative thinking. In fact, any physicist, biologist, mathematician, or researcher in any number of fields developing or improving products and systems will find the answers and ideas they need. As with the first edition, the new edition not only stands as a record of accomplishment in control engineering but provides researchers with the means to make further advances.

This book is on the iterative learning control (ILC) with focus on the design and implementation. We approach the ILC design based on the frequency domain analysis and address the ILC implementation based on the sampled data methods. This is the first book of ILC from frequency domain and sampled data methodologies. The frequency domain design methods offer ILC users insights to the convergence performance which is of practical benefits. This book presents a comprehensive framework with various methodologies to ensure the learnable bandwidth in the ILC system to be set with a balance between learning performance and learning stability. The sampled data implementation ensures effective execution of ILC in practical dynamic systems. The presented sampled data ILC methods also ensure the balance of performance and stability of learning process. Furthermore, the presented theories and methodologies are tested with an ILC controlled robotic system. The experimental results show that the machines can work in much higher accuracy than a feedback control alone can offer. With the proposed ILC algorithms, it is possible that machines can work to their hardware design limits set by sensors and actuators. The target audience for this book includes scientists, engineers and practitioners involved in any systems with repetitive operations.

A timely guide using iterative learning control (ILC) as a solution for multi-agent systems (MAS) challenges, showcasing recent advances and industrially relevant applications Explores the synergy between the important topics of iterative learning control (ILC) and multi-agent systems (MAS) Concisely summarizes recent advances and significant applications in ILC methods for power grids, sensor networks and control processes Covers basic theory, rigorous mathematics as well as engineering practice

This volume contains the proceedings of the KKA 2017 – the 19th Polish Control Conference, organized by the Department of Automatics and Biomedical Engineering, AGH University of Science and Technology in Kraków, Poland on June 18–21, 2017, under the auspices of the Committee on Automatic Control and Robotics of the Polish Academy of Sciences, and the Commission for Engineering Sciences of the Polish Academy of Arts and Sciences. Part 1 deals with general issues of modeling and control, notably flow modeling and control, sliding mode, predictive, dual, etc. control. In turn, Part 2 focuses on optimization, estimation and prediction for control. Part 3 is concerned with autonomous vehicles, while Part 4 addresses applications. Part 5 discusses computer methods in control, and Part 6 examines fractional order calculus in the modeling and control of dynamic systems. Part 7 focuses on modern robotics. Part 8 deals with modeling and identification, while Part 9 deals with problems related to security, fault detection and diagnostics. Part 10 explores intelligent systems in automatic control, and Part 11 discusses the use of control tools and techniques in biomedical engineering. Lastly, Part 12 considers engineering education and teaching with regard to automatic control and robotics.

Run-to-Run Control in Semiconductor Manufacturing

Convergence, Robustness and Applications

Filtered Repetitive Control with Nonlinear Systems

Iterative Learning Stabilization and Fault-Tolerant Control for Batch Processes

Algorithms Design and Convergence Analysis

Iterative Learning Control for Equations with Fractional Derivatives and Impulses

This book introduces iterative learning control (ILC) and its applications to the new equations such as fractional order equations, impulsive equations, delay equations, and multi-agent systems, which have not been presented in other books on conventional fields. ILC is an important branch of intelligent control, which is applicable to robotics, process control, and biological systems. The fractional version of ILC updating laws and formation control are presented in this book. ILC design for impulsive equations and inclusions are also established. The broad variety of achieved results with rigorous proofs and many numerical examples make this book unique. This book is useful for graduate students studying ILC involving fractional derivatives and impulsive conditions as well as for researchers working in pure and applied mathematics, physics, mechanics, engineering, biology, and related disciplines.

Though there have been significant advances in the theory and applications of linear time-invariant systems, developments regarding repetitive control have been sporadic. At the same time, there is a dearth of literature on repetitive control (RC) for nonlinear systems. Addressing that gap, this book discusses a range of basic methods for solving RC problems in nonlinear systems, including two commonly used methods and three original ones. Providing valuable tools for researchers working on the development of repetitive control, these new and fundamental methods are one of the major features of the book, which will benefit researchers, engineers, and graduate students in e.g. the field of control theory.

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.

The material presented in this book addresses the analysis and design of learning control systems. It begins with an introduction to the concept of learning control, including a comprehensive literature review. The text follows with a complete and unifying analysis of the learning control problem for linear LTI systems using a system-theoretic approach which offers insight into the nature of the solution of the learning control problem. Additionally, several design methods are given for LTI learning control, incorporating a technique based on parameter estimation and a one-step learning control algorithm for finite-horizon problems. Further chapters focus upon learning control for deterministic nonlinear systems, and a time-varying learning controller is presented which can be applied to a class of nonlinear systems, including the models of typical robotic manipulators. The book concludes with the application of artificial neural networks to the learning control problem. Three specific ways to neural nets for this purpose are discussed, including two methods which use backpropagation training and reinforcement learning. The appendices in the book are particularly useful because they serve as a tutorial on artificial neural networks.

Model-Based Control:

An Optimization Paradigm

Theory and Applications

Nonlinear Iterative Learning Control System Design and Analysis

Iterative Learning Control for Systems with Iteration-Varying Trial Lengths

Synthesis and Analysis of Design Methods for Improved Tracking Performance in Iterative Learning and Repetitive Control

This book presents the select proceedings of the International Conference on Automation, Signal Processing, Instrumentation and Control (i-CASIC) 2020. The book mainly focuses on emerging technologies in electrical systems, IoT-based instrumentation, advanced industrial automation, and advanced image and signal processing. It also includes studies on the analysis, design and implementation of instrumentation systems, and high-accuracy and energy-efficient controllers. The contents of this book will be useful for beginners, researchers as well as professionals interested in instrumentation and control, and other allied fields.

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 volume is composed of invited papers on learning and control. The contents form the proceedings of a workshop held in January 2008, in Hyderabad that honored the 60th birthday of Doctor Mathukumalli Vidyasagar. The 14 papers, written by international specialists in the field, cover a variety of interests within the broader field of learning and control. The diversity of the research provides a comprehensive overview of a field of great interest to control and system theorists.

This book presents a comprehensive and detailed study on iterative learning control (ILC) for systems with iteration-varying trial lengths. Instead of traditional ILC, which requires systems to repeat on a fixed time interval, this book focuses on a more practical case where the trial length might randomly vary from iteration to iteration. The iteration-varying trial lengths may be different from the desired trial length, which can cause redundancy or dropouts of control information in ILC, making ILC design a challenging problem. The book focuses on the synthesis and analysis of ILC for both linear and nonlinear systems with iteration-varying trial lengths, and proposes various novel techniques to deal with the precise tracking problem under non-repeatable trial lengths, such as moving window, switching system, and searching-based moving average operator. It not only discusses recent advances in ILC for systems with iteration-varying trial lengths, but also includes numerous intuitive figures to allow readers to develop an in-depth understanding of the intrinsic relationship between the incomplete information environment and the essential tracking performance. This book is intended for academic scholars and engineers who are interested in learning about control, data-driven control, networked control systems, and related fields. It is also a useful resource for graduate students in the above field.

Robustness and Monotonic Convergence for Interval Systems

Soft Computing and Intelligent Systems

Iterative Learning Control

Active Flow and Combustion Control 2014

Nonlinear Control Systems 2004

Proceedings of the Fifth International Conference on High Performance Scientific Computing, March 5-9, 2012, Hanoi, Vietnam

The book reports on the latest theoretical and experimental advances in the field of active flow and combustion control. It covers new developments in actuator technology and sensing, in robust and optimal open- and closed-loop control, as well as in model reduction for control. It collects

contributions presented during the third edition of the Active Flow and Combustion Control conference, held in September 10-12, 2014 at the Technische Universität Berlin (Germany). This conference, as well as the research presented in the book, have been supported by the collaborative research center SFB 1029 -Substantial efficiency increase in gas turbines through direct use of coupled unsteady combustion and flow dynamics, funded by the DFG (German Research Foundation).

The Control Systems Handbook

Synthesis and Analysis

Proceedings of KKA 2017—The 19th Polish Control Conference, Kraków, Poland, June 18–21, 2017