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Rolf Isermann



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Performance Assessment of Control Loops Biao Huang, Sirish L. Shah, 2012-12-06 The series *Advances in Industrial Control* 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 Benchmarking is a technique first applied by Rank Xerox in the late 1970s for business processes As a subject in the commercial arena benchmarking thrives with for example a European Benchmarking Forum It has taken rather longer for benchmarking to make the transfer to the technical domain and even now the subject is making a slow headway A key research step in this direction was taken by Harris 1989 who used minimum variance control as a benchmark for controller loop assessment This contribution opened up the area and a significant specialist literature has now developed Significant support for the methodology was given by Honeywell who have controller assessment routines in their process control applications software therefore it is timely to welcome a first monograph on controller performance assessment by Biao Huang and Sirish Shah to the *Advances in Industrial Control* series

Fault Detection and Diagnosis in Industrial Systems L.H. Chiang, E.L. Russell, R.D. Braatz, 2012-12-06 Early and accurate fault detection and diagnosis for modern chemical plants can minimise downtime increase the safety of plant operations and reduce manufacturing costs The process monitoring techniques that have been most effective in practice are based on models constructed almost entirely from process data The goal of the book is to present the theoretical background and practical techniques for data driven process monitoring Process monitoring techniques presented include Data driven methods principal component analysis Fisher discriminant analysis partial least squares and canonical variate analysis Analytical Methods parameter estimation observer based methods and parity relations Knowledge based methods causal analysis expert systems and pattern recognition The text demonstrates the application of all of the data driven process monitoring techniques to the Tennessee Eastman plant simulator demonstrating the strengths and weaknesses of each approach in detail This aids the reader in selecting the right method for his process application Plant simulator and homework problems in which students apply the process monitoring techniques to a non trivial simulated process and can compare their performance with that obtained in the case studies in the text are included A number of additional homework problems encourage the reader to implement and obtain a deeper understanding of the techniques The reader will obtain a background in data driven techniques for fault detection and diagnosis including the ability to implement the techniques and to know how to select the right technique for a particular application

Diagnosis and Fault-tolerant Control Volume 2 Vicenc Puig, Silvio Simani, 2021-12-29 This book presents recent advances in fault

diagnosis and fault tolerant control of dynamic processes Its impetus derives from the need for an overview of the challenges of the fault diagnosis technique and sustainable control especially for those demanding systems that require reliability availability maintainability and safety to ensure efficient operations Moreover the need for a high degree of tolerance with respect to possible faults represents a further key point primarily for complex systems as modeling and control are inherently challenging and maintenance is both expensive and safety critical Diagnosis and Fault tolerant Control 2 also presents and compares different fault diagnosis and fault tolerant schemes using well established innovative strategies for modeling the behavior of the dynamic process under investigation An updated treatise of diagnosis and fault tolerant control is addressed with the use of essential and advanced methods including signal based model based and data driven techniques Another key feature is the application of these methods for dealing with robustness and reliability

Hybrid Systems: Computation and Control Maria D. Di Benedetto, Alberto L. Sangiovanni-Vincentelli, 2003-06-29 This volume contains the proceedings of the Fourth Workshop on Hybrid Systems Computation and Control HSCC 2001 held in Rome Italy on March 28 30 2001 The Workshop on Hybrid Systems attracts researchers from industry and academia interested in modeling analysis synthesis and implementation of dynamic and reactive systems involving both discrete integer logical symbolic and continuous behaviors It is a forum for the discussion of the test developments in all aspects of hybrid systems including formal models and computational representations algorithms and heuristics computational tools and new challenging applications The Fourth HSCC International Workshop continues the series of workshops held in Grenoble France HART 97 Berkeley California USA HSCC 98 Nijmegen The Netherlands HSCC 99 and Pittsburgh Pennsylvania USA HSCC 2000 Proceedings of these workshops have been published in the Lecture Notes in Computer Science LNCS series by Springer Verlag In line with the beautiful work that led to the design of the palace in which the workshop was held Palazzo Lancellotti in Rome resulting from the collaboration of many artists and architects of different backgrounds the challenge faced by the hybrid system community is to harmonize and extract the best from two main research areas computer science and control theory

Computer Aided Systems Theory - EUROCAST 2001 Roberto Moreno-Diaz, Bruno Buchberger, Jose-Luis Freire, 2003-08-14 The concept of CAST as Computer Aided Systems Theory was introduced by F Pichler in the late 1980s to include those computer theoretical and practical developments as tools to solve problems in System Science It was considered as the third component the other two being CAD and CAM necessary to build the path from Computer and Systems Sciences to practical developments in Science and Engineering The University of Linz organized the first CAST workshop in April 1988 which demonstrated the acceptance of the concepts by the scientific and technical community Next the University of Las Palmas de Gran Canaria joined the University of Linz to organize the first international meeting on CAST Las Palmas February 1989 under the name EUROCAST 89 This was a very successful gathering of systems theorists computer scientists and engineers from most European countries North America and Japan It was agreed that EUROCAST international conferences would be organized

every two years alternating between Las Palmas de Gran Canaria and a continental European location Thus successive EUROCAST meetings have taken place in Krems 1991 Las Palmas 1993 Innsbruck 1995 Las Palmas 1997 and Vienna 1999 in addition to an extra European CAST Conference in Ottawa in 1994

Hybrid Systems V Panos J. Antsaklis, Wolf Kohn, Michael Lemmon, Anil Nerode, Shankar Sastry, 2003-07-31 This book constitutes the strictly refereed post proceedings of the 5th International Hybrid Systems Workshop held in Notre Dame Indiana USA in September 1998 The 23 revised full papers presented in the book have gone through two rounds of thorough reviewing and revision The volume presents state of the art research results and particularly addresses such areas as program verification concurrent and distributed processes logic programming logics of programs discrete event simulation calculus of variations optimization differential geometry Lie algebras automata theory dynamical systems etc

Application and Theory of Petri Nets 1997 Pierre Azema, Gianfranco Balbo, 1997-06-04 This book constitutes the refereed proceedings of the 18th International Conference on the Application and Theory of Petri Nets ICATPN 97 held in Toulouse France in June 1997 The 22 revised full papers presented in the volume were selected from a total of 61 submissions also included are three invited contributions All relevant topics in the area are addressed Besides a variety of Petri net classes workflow management telecommunication networking constraint satisfaction program semantics concurrency and temporal logic are among the topics addressed

Fault-Diagnosis Systems Rolf Isermann, 2006-01-16 With increasing demands for efficiency and product quality plus progress in the integration of automatic control systems in high cost mechatronic and safety critical processes the field of supervision or monitoring fault detection and fault diagnosis plays an important role The book gives an introduction into advanced methods of fault detection and diagnosis FDD After definitions of important terms it considers the reliability availability safety and systems integrity of technical processes Then fault detection methods for single signals without models such as limit and trend checking and with harmonic and stochastic models such as Fourier analysis correlation and wavelets are treated This is followed by fault detection with process models using the relationships between signals such as parameter estimation parity equations observers and principal component analysis The treated fault diagnosis methods include classification methods from Bayes classification to neural networks with decision trees and inference methods from approximate reasoning with fuzzy logic to hybrid fuzzy neuro systems Several practical examples for fault detection and diagnosis of DC motor drives a centrifugal pump automotive suspension and tire demonstrate applications

Computer Aided Systems Theory - EUROCAST 2001 Roberto Moreno-Díaz, Bruno Buchberger, 2001-11-28 This book constitutes the thoroughly refereed post proceedings of the 8th International Workshop on Computer Aided Systems Theory EUROCAST 2001 held in Las Palmas de Gran Canaria Spain in February 2001 The 48 revised full papers presented together with two invited papers were carefully selected during two rounds of reviewing and revision The book offers topical sections on computer aided systems theory mathematical and logical formalisms information and decision complexity neural like computation automation and control computer algebra and

automated theorem proving and functional programming and lambda calculus **Proceedings of the ... American Control Conference**, 1998 Management and Control of Production and Logistics 2004 (MCPL 2004) Gaston Lefranc, 2006-01-30 *Focus on Robotics Research* John X. Liu, 2006 Robotics began as a science fiction creation which has become quite real first in assembly line operations such as automobile manufacturing aeroplane construction etc They have now reached such areas as the internet ever multiplying medical uses and sophisticated military applications Control of today's robots is often remote which requires even more advanced computer vision capabilities as well as sensors and interface techniques Learning has become crucial for modern robotic systems as well This book brings together leading research in this exciting field *Data-driven Methods for Fault Detection and Diagnosis in Chemical Processes* Evan L. Russell, Leo H. Chiang, Richard D. Braatz, 2012-12-06 Early and accurate fault detection and diagnosis for modern chemical plants can minimise downtime increase the safety of plant operations and reduce manufacturing costs The process monitoring techniques that have been most effective in practice are based on models constructed almost entirely from process data The goal of the book is to present the theoretical background and practical techniques for data driven process monitoring Process monitoring techniques presented include Principal component analysis Fisher discriminant analysis Partial least squares Canonical variate analysis The text demonstrates the application of all of the data driven process monitoring techniques to the Tennessee Eastman plant simulator demonstrating the strengths and weaknesses of each approach in detail This aids the reader in selecting the right method for his process application Plant simulator and homework problems in which students apply the process monitoring techniques to a nontrivial simulated process and can compare their performance with that obtained in the case studies in the text are included A number of additional homework problems encourage the reader to implement and obtain a deeper understanding of the techniques The reader will obtain a background in data driven techniques for fault detection and diagnosis including the ability to implement the techniques and to know how to select the right technique for a particular application Cost Oriented Automation 2004 Marek Zaremba, Jerzy Z Sasiadek, H H Erbe, 2005-08-05 Cost Oriented Automation 2004 addresses a new integration environment that enables the evolution of collaborative e design paradigm This design paradigm aims at seamless and dynamic integration of distributed design objects and engineering tools over the internet *System, Structure and Control 2004* Sabine Mondie, 2005-05-11 *Applied and Computational Control, Signals, and Circuits* Biswa N. Datta, 2012-12-06 The purpose of this annual series Applied and Computational Control Signals and Circuits is to keep abreast of the fast paced developments in computational mathematics and scientific computing and their increasing use by researchers and engineers in control signals and circuits The series is dedicated to fostering effective communication between mathematicians computer scientists computational scientists software engineers theorists and practicing engineers This interdisciplinary scope is meant to blend areas of mathematics such as linear algebra operator theory and certain branches of analysis and computational mathematics numerical linear

algebra numerical differential equations large scale and parallel matrix computations numerical optimization with control and systems theory signal and image processing and circuit analysis and design The disciplines mentioned above have long enjoyed a natural synergy There are distinguished journals in the fields of control and systems theory as well as signal processing and circuit theory which publish high quality papers on mathematical and engineering aspects of these areas however articles on their computational and applications aspects appear only sporadically At the same time there has been tremendous recent growth and development of computational mathematics scientific computing and mathematical software and the resulting sophisticated techniques are being gradually adapted by engineers software designers and other scientists to the needs of those applied disciplines

Diagnosis and Fault-Tolerant Control Mogens Blanke, Jochen Schröder, 2003 The book presents effective model based analysis and design methods for fault diagnosis and fault tolerant control Architectural and structural models are used to analyse the propagation of the fault through the process to test the fault detectability and to find the redundancies in the process that can be used to ensure fault tolerance Design methods for diagnostic systems and fault tolerant controllers are presented for processes that are described by analytical models by discrete event models or that can be dealt with as quantised systems Four case studies on pilot processes show the applicability of the presented methods The theoretical results are illustrated by two running examples which are used throughout the book The book addresses engineering students engineers in industry and researchers who wish to get a survey over the variety of approaches to process diagnosis and fault tolerant control

Nonlinear Model Based Process Control Ridvan Berber, Costas Kravaris, 1998 The increasingly competitive environment within which modern industry has to work means that processes have to be operated over a wider range of conditions in order to meet constantly changing performance targets Add to this the fact that many industrial operations are nonlinear and the need for on line control algorithms for nonlinear processes becomes clear Major progress has been booked in constrained model based control and important issues of nonlinear process control have been solved This text surveys the state of the art in nonlinear model based control technology by writers who have actually created the scientific profile A broad range of issues are covered in depth from traditional nonlinear approaches to nonlinear model predictive control from nonlinear process identification and state estimation to control integrated design Advances in the control of inverse response and unstable processes are presented Comparisons with linear control are given and case studies are used for illustration

CONTROL SYSTEMS, ROBOTICS AND AUTOMATION - Volume XIII Heinz D. Unbehauen, 2009-10-11 This Encyclopedia of Control Systems Robotics and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias This 22 volume set contains 240 chapters each of size 5000 30000 words with perspectives applications and extensive illustrations It is the only publication of its kind carrying state of the art knowledge in the fields of Control Systems Robotics and Automation and is aimed by virtue of the several applications at the following five major target audiences University and

College Students Educators Professional Practitioners Research Personnel and Policy Analysts Managers and Decision Makers and NGOs Information Computing And Automation (In 3 Volumes) - Proceedings Of The International Conference
Jian Ping Li,Igor Bloshanskii,Lionel M Ni,S S Pandey,Simon X Yang,2008-04-25 Wavelet analysis and its applications have become one of the fastest growing research areas in the past several years Wavelet theory has been employed in many fields and applications such as signal and image processing communication systems biomedical imaging radar air acoustics and endless other areas Active media technology is concerned with the development of autonomous computational or physical entities capable of perceiving reasoning adapting learning cooperating and delegating in a dynamic environment This book consists of carefully selected and received papers presented at the conference and is an attempt to capture the essence of the current state of the art in wavelet analysis and active media technology Invited papers included in this proceedings includes contributions from Prof P Zhang T D Bui and C Y Suen from Concordia University Canada Prof N A Strelkov and V L Dol nikov from Yaroslavl State University Russia Prof Chin Chen Chang and Ching Yun Chang from Taiwan Prof S S Pandey from R D University India and Prof I L Bloshanskii from Moscow State Regional University Russia

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