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New Methods of Parameter and State Estimation



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Rolf Isermann, Marco Münchhof

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On power system automation: Christoph Brosinsky, 2023-01-01 The ubiquitous digital transformation also influences power system operation Emerging real time applications in information IT and operational technology OT provide new opportunities to address the increasingly demanding power system operation imposed by the progressing energy transition This IT OT convergence is epitomised by the novel Digital Twin DT concept By integrating sensor data into analytical models and aligning the model states with the observed system a power system DT can be created As a result a validated high fidelity model is derived which can be applied within the next generation of energy management systems EMS to support power system operation By providing a consistent and maintainable data model the modular DT centric EMS proposed in this work addresses several key requirements of modern EMS architectures It increases the situation awareness in the control room enables the implementation of model maintenance routines and facilitates automation approaches while raising the confidence into operational decisions deduced from the validated model This gain in trust contributes to the digital transformation and enables a higher degree of power system automation By considering operational planning and power system operation processes a direct link to practice is ensured. The feasibility of the concept is examined by numerical case Modelling and Parameter Estimation of Dynamic Systems J.R. Raol, G. Girija, J. Singh, 2004-08-13 This book studies presents a detailed examination of the estimation techniques and modeling problems. The theory is furnished with several illustrations and computer programs to promote better understanding of system modeling and parameter estimation Soft Computing Techniques in Solid Waste and Wastewater Management Rama Rao Karri, R Gobinath, Mohammad Hadi Dehghani, 2021-07-24 Soft Computing Techniques in Solid Waste and Wastewater Management is a thorough guide to computational solutions for researchers working in solid waste and wastewater management operations. This book covers in depth analysis of process variables their effects on overall efficiencies and optimal conditions and procedures to improve performance using soft computing techniques These topics coupled with the systematic analyses described will help readers understand various techniques that can be effectively used to achieve the highest performance In depth case studies along with discussions on applications of various soft computing techniques help readers control waste processes and come up with short term mid term and long term strategies Waste management is an increasingly important field due to rapidly increasing levels of waste production around the world Numerous potential solutions for reducing waste production are underway including applications of machine learning and computational studies on waste management processes This book details the diverse approaches and techniques in these fields providing a single source of information researchers and industry practitioners It is ideal for academics researchers and engineers in waste management environmental science environmental engineering and computing with relation to environmental science and waste management Provides a comprehensive reference on the implementation of soft computing techniques in waste management drawing together current research and

future implications Includes detailed algorithms used enabling authors to understand and appreciate potential applications Presents relevant case studies in solid and wastewater management that show real world applications of discussed Handbook of Computational Intelligence in Biomedical Engineering and Healthcare Janmenjoy Nayak, Bighnaraj Naik, Danilo Pelusi, Asit Kumar Das, 2021-04-08 Handbook of Computational Intelligence in Biomedical Engineering and Healthcare helps readers analyze and conduct advanced research in specialty healthcare applications surrounding oncology genomics and genetic data ontologies construction bio memetic systems biomedical electronics protein structure prediction and biomedical data analysis The book provides the reader with a comprehensive guide to advanced computational intelligence spanning deep learning fuzzy logic connectionist systems evolutionary computation cellular automata self organizing systems soft computing and hybrid intelligent systems in biomedical and healthcare applications Sections focus on important biomedical engineering applications including biosensors enzyme immobilization techniques immuno assays and nanomaterials for biosensors and other biomedical techniques Other sections cover gene based solutions and applications through computational intelligence techniques and the impact of nonlinear unstructured data on experimental analysis Presents a comprehensive handbook that covers an Introduction to Computational Intelligence in Biomedical Engineering and Healthcare Computational Intelligence Techniques and Advanced and Emerging Techniques in Computational Intelligence Helps readers analyze and do advanced research in specialty healthcare applications Includes links to websites videos articles and other online content to expand and support primary learning objectives Dynamic Systems Models Josif A. Boguslavskiy, 2016-03-22 This monograph is an exposition of a novel method for solving inverse problems a method of parameter estimation for time series data collected from simulations of real experiments These time series might be generated by measuring the dynamics of aircraft in flight by the function of a hidden Markov model used in bioinformatics or speech recognition or when analyzing the dynamics of asset pricing provided by the nonlinear models of financial mathematics Dynamic Systems Models demonstrates the use of algorithms based on polynomial approximation which have weaker requirements than already popular iterative methods Specifically they do not require a first approximation of a root vector and they allow non differentiable elements in the vector functions being approximated The text covers all the points necessary for the understanding and use of polynomial approximation from the mathematical fundamentals through algorithm development to the application of the method in for instance aeroplane flight dynamics or biological sequence analysis The technical material is illustrated by the use of worked examples and methods for training the algorithms are included Dynamic Systems Models provides researchers in aerospatial engineering bioinformatics and financial mathematics as well as computer scientists interested in any of these fields with a reliable and effective numerical method for nonlinear estimation and solving boundary problems when carrying out control design It will also be of interest to academic researchers studying inverse problems and their solution **Nonlinear Filtering** Jitendra R. Raol, Girija

Gopalratnam, Bhekisipho Twala, 2017-07-12 Nonlinear Filtering covers linear and nonlinear filtering in a comprehensive manner with appropriate theoretic and practical development Aspects of modeling estimation recursive filtering linear filtering and nonlinear filtering are presented with appropriate and sufficient mathematics A modeling control system approach is used when applicable and detailed practical applications are presented to elucidate the analysis and filtering concepts MATLAB routines are included and examples from a wide range of engineering applications including aerospace automated manufacturing robotics and advanced control systems are referenced throughout the text ... American Control Conference ,2005 **Proceedings of the 14th International Conference on Computer Engineering and Networks** Guanggiang Yin, Xiaodong Liu, Jian Su, Yangzhao Yang, 2025-05-06 This conference proceedings is a collection of papers accepted for CENet2024 the 14th International Conference on Computer Engineering and Networks held in Kashi China 18 21 October 2024 The topics covered include Internet of Things and Smart Systems Artificial Intelligence and Applications Detection Analysis and Application of Communication Systems Cloud Computing and Security and Medical Engineering and Information Systems Each section of this book can serve as an excellent reference for industry practitioners university faculty research fellows undergraduate and graduate students who wish to build a knowledge base of the latest advances and state of the art practices in the topics covered Using this knowledge they will be able to design implement and manage systems that are both complex and trustworthy We would like to thank the authors for their hard work and dedication and the reviewers for their efforts in ensuring that only the highest quality papers were selected Without their contributions the proceedings would not have been possible Special Topics in Structural Dynamics, **Volume 6** Randall Allemang, James De Clerck, Christopher Niezrecki, Alfred Wicks, 2013-06-26 Special Topics in Structural Dynamics Volume 6 Proceedings of the 31st IMAC A Conference and Exposition on Structural Dynamics 2013 the sixth volume of seven from the Conference brings together contributions to this important area of research and engineering The collection presents early findings and case studies on fundamental and applied aspects of Structural Dynamics including papers on Teaching Experimental Analytical Structural Dynamics Sensors Instrumentation Aircraft Aerospace Bio Dynamics Sports Equipment Dynamics Advanced ODS Stress Estimation Shock Vibration Full Field Optical Measurements Image Analysis Structural Health Monitoring Operational Modal Analysis Wind Turbine Dynamics Rotating Machinery Finite Element Methods Energy Harvesting PARAMETER ESTIMATION IN DYNAMIC SYSTEMS. David Burke Bartus, 1987 solution of model equations Scientific and Technical Aerospace Reports ,1993 **Fault Detection, Supervision** and Safety of Technical Processes 2003 (SAFEPROCESS 2003) Marcel Staroswiecki, Eva Wu, 2004-02-27 A three volume work bringing together papers presented at SAFEPROCESS 2003 including four plenary papers on statistical physical model based and logical model based approaches to fault detection and diagnosis as well as 178 regular papers **Identification** of Dynamic Systems Rolf Isermann, Marco Münchhof, 2010-11-22 Precise dynamic models of processes are required for

many applications ranging from control engineering to the natural sciences and economics Frequently such precise models cannot be derived using theoretical considerations alone Therefore they must be determined experimentally This book treats the determination of dynamic models based on measurements taken at the process which is known as system identification or process identification Both offline and online methods are presented i e methods that post process the measured data as well as methods that provide models during the measurement The book is theory oriented and application oriented and most methods covered have been used successfully in practical applications for many different processes Illustrative examples in this book with real measured data range from hydraulic and electric actuators up to combustion engines Real experimental data is also provided on the Springer webpage allowing readers to gather their first experience with the methods presented in this book Among others the book covers the following subjects determination of the non parametric frequency response fast Fourier transform correlation analysis parameter estimation with a focus on the method of Least Squares and modifications identification of time variant processes identification in closed loop identification of continuous time processes and subspace methods Some methods for nonlinear system identification are also considered such as the Extended Kalman filter and neural networks The different methods are compared by using a real three mass oscillator process a model of a drive train For many identification methods hints for the practical implementation and application are provided The book is intended to meet the needs of students and practicing engineers working in research and development design and Parameter Estimation in Nonlinear Dynamic Systems W. J. H. Stortelder, 1998 manufacturing **Iournal** of the **American Statistical Association** ,2008 CEP Software Directory, 1997 Dissertation Abstracts International .2006 International Aerospace Abstracts ,1999 *Ubicomp ...* ,2003 NASA SP., 1992

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