Guang-Ren Duan

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Analysis and Design of Descriptor Linear Systems

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Analysis And Design Of Descriptor Linear Systems

Joacim Rocklöv

Analysis And Design Of Descriptor Linear Systems:

Analysis and Design of Descriptor Linear Systems Guang-Ren Duan,2010-09-14 Descriptor linear systems theory is an important part in the general field of control systems theory and has attracted much attention in the last two decades In spite of the fact that descriptor linear systems theory has been a topic very rich in content there have been only a few books on this topic This book provides a systematic introduction to the theory of continuous time descriptor linear systems and aims to provide a relatively systematic introduction to the basic results in descriptor linear systems theory The clear representation of materials and a large number of examples make this book easy to understand by a large audience General readers will find in this book a comprehensive introduction to the theory of descriptive linear systems Researchers will find a comprehensive description of the most recent results in this theory and students will find a good introduction to some important problems in linear systems theory **Analysis and Design of Descriptor Linear Systems** Guang-Ren Duan,2010-11-04 Descriptor linear systems theory is an important part in the general field of control systems theory and has attracted much attention in the last two decades In spite of the fact that descriptor linear systems theory has been a topic very rich in content there have been only a few books on this topic This book provides a systematic introduction to the theory of continuous time descriptor linear systems and aims to provide a relatively systematic introduction to the basic results in descriptor linear systems theory The clear representation of materials and a large number of examples make this book easy to understand by a large audience General readers will find in this book a comprehensive introduction to the theory of descriptive linear systems Researchers will find a comprehensive description of the most recent results in this theory and students will find a good introduction to some important problems in linear systems theory *Automation 2023: Key Challenges in Automation, Robotics and Measurement Techniques* Roman Szewczyk,Cezary Zieliński,Małgorzata Kaliczyńska,Vytautas Bučinskas,2023-02-04 This volume presents the results of recent research which supports the postulated transformation It contains papers written by both scientists and engineers dealing with diverse aspects of measuring techniques robotics mechatronics systems control industrial automation numerical modelling and simulation as well as application of artificial intelligence techniques required by the transformation of the industry towards the Industry 4 0 We strongly believe that the solutions and guidelines presented in this volume will be useful for both researchers and engineers solving problems that have emerged during the recent crisis **Trends in Advanced Intelligent Control, Optimization and Automation** Wojciech Mitkowski,Janusz Kacprzyk,Krzysztof Oprzędkiewicz,Paweł Skruch,2017-06-06 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 Krak w 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

Theoretical Developments and Applications of Non-Integer Order Systems Stefan Domek,Paweł Dworak,2015-08-20 This volume is devoted to presentation of new results of research on systems of non integer order called also fractional systems Their analysis and practical implementation have been the object of spontaneous development for a few last decades The fractional order models can depict a physical plant better than the classical integer order ones This covers different research fields such as insulator properties visco elastic materials electrodynamic electrothermal electrochemical economic processes modelling etc On the other hand fractional controllers often outperform their integer order counterparts This volume contains new ideas and examples of implementation theoretical and pure practical aspects of using a non integer order calculus It is divided into four parts covering mathematical fundamentals modeling and approximations controllability observability and stability problems and practical applications of fractional control systems The first part expands the base of tools and methods of the mathematical basis for non integer order calculus Part two focuses on new methods and developments in process modeling and fractional derivatives approximations In the third part a bunch of papers which raise problems of controllability observability and stability of non integer order systems is provided Part four is devoted to presentation of different fractional order control applications This book was created thanks to many experts in the field of fractional calculus authors anonymous referees whose comments allowed us to improve the final form of the papers and active and inspiring discussion of the participants of RRNR 2015 the 7th Conference on Non Integer Order Calculus and Its Applications that was organized by the Faculty of Electrical Engineering West Pomeranian University of Technology Szczecin Poland **Proceedings of 19th Latin American Control Congress (LACC 2022)** Orestes Llanes-Santiago,2023-05-09 This book presents the main results of the 19th Latin American Congress of Automatic Control held in November 2022 in Havana Cuba The Congress showed several main research results obtained by researchers from diverse countries in the last four years Of the papers sent to Congress 28 were finally accepted for presentation after a rigorous analysis of scientific novelty and quality For their presentation in this book the papers were divided into 5 major sections that appear in the following order Part 1 Robust and Nonlinear Control The main research topics addressed in this part are related to fault tolerant control loops control by sliding modes and robust tuning of PID controllers Examples of electrical motors and chemical processes are used to demonstrate the feasibility of using the proposed techniques Part 2

Fault Diagnosis in Industrial Systems Fault diagnosis in industrial plants is a very important topic in the Industry 4 0 paradigm In this part new techniques of fault diagnosis in mechanical systems using Poincar features a real case study for predicting the time of the remaining job cycle at a water treatment plant and a predictive fault diagnosis for isolated photovoltaic systems are presented A novel methodology for detecting and locating cyber attacks in water distribution networks using computational intelligence tools is also presented Part 3 Robotic and Autonomous Systems New control strategies for path following for autonomous tractors and unmanned aquatic vehicles are analyzed in this part Moreover the important topic related to the battery health aware model predictive control planning for autonomous racing vehicles and the use of robots for monitoring and remediation applications are examined Part 4 Modeling Identification and Delayed Systems A model based methodology for the efficient selection of centrifugal pumps the use of probabilistic Boolean networks in smart grid models the utilization of PSO metaheuristic algorithm in the selection of a model structure and two schemes to control high order delayed systems are among the main topics examined in this part Part 5 Low Cost Systems and Biomedical Applications In this part some applications of low cost monitoring and control systems and two automatic systems used for the characterization of creatinine in wastes samples during hemodialysis process and differential acquisition of blood pressure are shown **Generalized Sylvester Equations** Guang-Ren Duan,2015-06-09 Provides One Unified Formula That Gives Solutions to Several Types of GSEsGeneralized Sylvester equations GSEs are applied in many fields including applied mathematics systems and control and signal processing Generalized Sylvester Equations Unified Parametric Solutions presents a unified parametric approach for solving various types of GSEs *Advances in State Estimation, Diagnosis and Control of Complex Systems* Ye Wang,2020-07-30 This book presents theoretical and practical findings on the state estimation diagnosis and control of complex systems especially in the mathematical form of descriptor systems The research is fully motivated by real world applications i e Barcelona s water distribution network which require control systems capable of taking into account their specific features and the limits of operations in the presence of uncertainties stemming from modeling errors and component malfunctions Accordingly the book first introduces a complete set based framework for explicitly describing the effects of uncertainties in the descriptor systems discussed In turn this set based framework is used for state estimation and diagnosis The book also presents a number of application results on economic model predictive control from actual water distribution networks and smart grids Moreover the book introduces a fault tolerant control strategy based on virtual actuators and sensors for such systems in the descriptor form **Complex Conjugate Matrix Equations for Systems and Control** Ai-Guo Wu,Ying Zhang,2016-08-08 The book is the first book on complex matrix equations including the conjugate of unknown matrices The study of these conjugate matrix equations is motivated by the investigations on stabilization and model reference tracking control for discrete time antilinear systems which are a particular kind of complex system with structure constraints It proposes useful approaches to obtain iterative solutions or

explicit solutions for several types of complex conjugate matrix equation It observes that there are some significant differences between the real complex matrix equations and the complex conjugate matrix equations For example the solvability of a real Sylvester matrix equation can be characterized by matrix similarity however the solvability of the con Sylvester matrix equation in complex conjugate form is related to the concept of con similarity In addition the new concept of conjugate product for complex polynomial matrices is also proposed in order to establish a unified approach for solving a type of complex matrix equation *Control of Discrete-Time Descriptor Systems* Alexey A. Belov,Olga G. Andrianova,Alexander P. Kurdyukov,2018-04-25 Control of Discrete Time Descriptor Systems takes an anisotropy based approach to the explanation of random input disturbance with an information theoretic representation It describes the random input signal more precisely and the anisotropic norm minimization included in the book enables readers to tune their controllers better through the mathematical methods provided The book contains numerous examples of practical applications of descriptor systems in various fields from robotics to economics and presents an information theoretic approach to the mathematical description of coloured noise Anisotropy based analysis and design for descriptor systems is supplied along with proofs of basic statements which help readers to understand the algorithms proposed and to undertake their own numerical simulations This book serves as a source of ideas for academic researchers and postgraduate students working in the control of discrete time systems The control design procedures outlined are numerically effective and easily implementable in MATLAB **Linear Systems Theory** Ben M. Chen,Zongli Lin,Yacov Shamash,2012-12-06 Structural properties play an important role in our understanding of linear systems in the state space representation The structural canonical form representation of linear systems not only reveals the structural properties but also facilitates the design of feedback laws that meet various control objectives In particular it decomposes the system into various subsystems These subsystems along with the interconnections that exist among them clearly show the structural properties of the system The simplicity of the subsystems and their explicit interconnections with each other lead us to a deeper insight into how feedback control would take effect on the system and thus to the explicit construction of feedback laws that meet our design specifications The discovery of structural canonical forms and their applications in feedback design for various performance specifications has been an active area of research for a long time The effectiveness of the structural decomposition approach has also been extensively explored in nonlinear systems and control theory in the recent past The aim of this book is to systematically present various canonical represen tations of the linear system that explicitly reveal different structural properties of the system and to report on some recent developments on its utilization in sys tem analysis and design

Advances in Systems, Signals, Control and Computers Vladimir B.. Bajić,1998 **MELECON '98, 9th Mediterranean Electrotechnical Conference** ,1998 **SIAM Journal on Matrix Analysis and Applications** ,1998 IEEE Transactions on Circuits and Systems ,2006 **Proceedings of MELECON** ,1998 **Computer Aided Control**

Systems Design 2000 (CACSD 2000) J. O. Gray,2001 This Proceedings contains the papers presented at the 8th IFAC Symposium on Computer Aided Control Systems Design held at Salford UK on 11 13 September 2000 Modelling has emerged as a central issue here and industrial users require the development of modelling languages for both analyses and design as well as generic models and tools which can be used for system identification optimisation and fault diagnostics Linear lumped parameter systems of general complexity are currently well addressed by a range of commercially available packages However there is a dearth of tools suitable for the analysis and synthesis of large scale distributed non linear hybrid and stochastic systems which are increasingly a feature in modern manufacturing and process engineering As the scale of the problems to be addressed increases there is a need for numerically robust and efficient computational procedures linked to powerful interactive graphical interfaces which maximise the user of limited human resources and of course standardised data bases which can be used with wide range of analysis and design procedures Topics covered included the now traditional domains of algorithm architectures and tools and there was a very welcome emphasis on applications where no less than four sessions were devoted to this important aspect **Proceedings, IEEE Control Systems Society ... Symposium on Computer-Aided Control System Design (CACSD).** ,2000 *Implicit Linear Systems* J.Dwight Aplevich,2014-03-12 These notes are an introduction to implicit models of linear dynamical systems with applications to modelling control system design and identification intended for control system engineers at the beginning graduate level Because they are non oriented the models are particularly useful where causality is unknown or may change They are implicit in all variables and closed under the algebraic operations and hence are useful for computer aided analysis and design They possess the vector matrix conceptual simplicity and computational feasibility of state space equations together with the generality of matrix fraction descriptions and admit of canonical forms for which the joint identification of system parameters and dynamic variables is linear The notes simplify generalize and complement much recent work on singular or descriptor models but do not duplicate it Sections are included on realizations canonical forms minimal representations algebraic design applications quadratic optimization identification large scale systems and extensions to multi dimensional and time varying systems Journal of Dynamic Systems, Measurement, and Control ,2007

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