

ORTHOGONAL FUNCTIONS IN SYSTEMS AND CONTROL

Kanti B Datta
B M Mohan

Department of Electrical Engineering
Indian Institute of Technology
KHARAGPUR - 721302, INDIA

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Orthogonal Functions In Systems And Control

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Orthogonal Functions In Systems And Control:

Orthogonal Functions in Systems and Control Kanti Bhushan Datta, B. M. Mohan, 1995 This book provides a systematic and unified approach to the analysis identification and optimal control of continuous time dynamical systems via orthogonal polynomials such as Legendre Laguerre Hermite Tchebycheff Jacobi Gegenbauer and via orthogonal functions such as sine cosine block pulse and Walsh This is the first book devoted to the application of orthogonal polynomials in systems and control establishing the superiority of orthogonal polynomials to other orthogonal functions **General Hybrid**

Orthogonal Functions and Their Applications in Systems and Control Amit Patra, Ganti Prasada Rao, 1996-04

Orthogonal Functions may be divided into two classes The class of continuous systems and the discontinuous class of piecewise constant systems Problems arise because continuous systems form an unsatisfactory basis for the expansion of functions containing discontinuities whilst piecewise constant systems insert artificial discontinuities into all representations Since these two classes of functions would be unsuccessful in coping with functions that possess both continuity and discontinuity we must look to General Hybrid Orthogonal Functions GHOF which have been shown to be the most appropriate in such situations This book introduces the system of GHOF discusses its properties develops an operational algebra for the discretization of continuous dynamic systems on the system of GHOF and illustrates its use as a flexible and powerful framework of computational tools in a wide range of systems and control **Piecewise Constant Orthogonal**

Functions and Their Application to Systems and Control Ganti Prasada Rao, 1983 *Triangular Orthogonal Functions for the Analysis of Continuous Time Systems* Anísa Deba, Gautam Sarkar, Anindita Sengupta, 2011 This book deals with a new set of triangular orthogonal functions which evolved from the set of well known block pulse functions BPF a major member of the piecewise constant orthogonal function PCOF family Unlike PCOF providing staircase solutions this new set of triangular functions provides piecewise linear solution with less mean integral squared error MISE After introducing the rich background of the PCOF family which includes Walsh block pulse and other related functions fundamentals of the newly proposed set such as basic properties function approximation integral operational metrics etc are presented This set has been used for integration of functions analysis and synthesis of dynamic systems and solution of integral equations The study ends with microprocessor based simulation of SISO control systems using sample and hold functions and Dirac delta functions *Piecewise Constant Orthogonal Functions and Their Application to Systems and Control* Ganti P.

Rao, 2014-03-12 *Analysis and Identification of Time-Invariant Systems, Time-Varying Systems, and Multi-Delay Systems using Orthogonal Hybrid Functions* Anish Deb, Srimanti Roychoudhury, Gautam Sarkar, 2016-01-05 This book introduces a new set of orthogonal hybrid functions HF which approximates time functions in a piecewise linear manner which is very suitable for practical applications The book presents an analysis of different systems namely time invariant system time varying system multi delay systems both homogeneous and non homogeneous type and the solutions are obtained in the form

of discrete samples The book also investigates system identification problems for many of the above systems The book is spread over 15 chapters and contains 180 black and white figures 18 colour figures 85 tables and 56 illustrative examples MATLAB codes for many such examples are included at the end of the book

Identification of Continuous-Time Systems N.K. Sinha,G.P. Rao,2012-12-06 In view of the importance of system identification the International Federation of Automatic Control IFAC and the International Federation of Operational Research Societies IFORS hold symposia on this topic every three years Interest in continuous time approaches to system identification has been growing in recent years This is evident from the fact that the of invited sessions on continuous time systems has increased from one in the 8th number Symposium that was held in Beijing in 1988 to three in the 9th Symposium in Budapest in 1991 It was during the 8th Symposium in August 1988 that the idea of bringing together important results on the topic of Identification of continuous time systems was conceived Several distinguished colleagues who were with us in Beijing at that time encouraged us by promising on the spot to contribute to a comprehensive volume of collective work Subsequently we contacted colleagues all over the world known for their work in this area with a formal request to contribute to the proposed volume The response was prompt and overwhelmingly encouraging We sincerely thank all the authors for their valuable contributions covering various aspects of identification of continuous time systems

Power Electronic Systems Anish Deb,Suchismita Ghosh,2017-12-19 A Totally Different Outlook on Power Electronic System Analysis Power Electronic Systems Walsh Analysis with MATLAB builds a case for Walsh analysis as a powerful tool in the study of power electronic systems It considers the application of Walsh functions in analyzing power electronic systems and the advantages offered by Walsh domain analysis of power electronic systems Solves Power Electronic Systems in an Unconventional Way This book successfully integrates power electronics as well as systems and control Incorporating a complete orthonormal function set very much unlike the sine cosine functions it introduces a blending between piecewise constant orthogonal functions and power electronic systems It explores the background and evolution of power electronics and discusses Walsh and related orthogonal basis functions It develops the mathematical foundation of Walsh analysis and first and second order system analyses by Walsh technique It also describes the Walsh domain operational method and how it is applied to linear system analysis Introduces Theories Step by Step While presenting the underlying principles of Walsh analysis the authors incorporate many illustrative examples and include a basic introduction to linear algebra and MATLAB programs They also examine different orthogonal piecewise constant basis functions like Haar Walsh slant block pulse functions and other related orthogonal functions along with their time scale evolution Analyzes pulse fed single input single output SISO first and second order systems Considers stepwise and continuously pulse width modulated chopper systems Describes a detailed analysis of controlled rectifier circuits Addresses inverter circuits Power Electronic Systems Walsh Analysis with MATLAB is written for postgraduate students researchers and academicians in the area of power electronics as well as systems and control

Identification of

Continuous-Time Systems Allamaraju Subrahmanyam, Ganti Prasada Rao, 2019-12-06 Models of dynamical systems are required for various purposes in the field of systems and control. The models are handled either in discrete time DT or in continuous time CT. Physical systems give rise to models only in CT because they are based on physical laws which are invariably in CT. In system identification, indirect methods provide DT models which are then converted into CT. Methods of directly identifying CT models are preferred to the indirect methods for various reasons. The direct methods involve a primary stage of signal processing followed by a secondary stage of parameter estimation. In the primary stage, the measured signals are processed by a general linear dynamic operation, computational or realized through prefilters to preserve the system parameters in their native CT form, and the literature is rich on this aspect. In this book, Identification of Continuous Time Systems: Linear and Robust Parameter Estimation, Allamaraju Subrahmanyam and Ganti Prasada Rao consider CT system models that are linear in their unknown parameters and propose robust methods of estimation. This book complements the existing literature on the identification of CT systems by enhancing the secondary stage through linear and robust estimation. In this book, the authors provide an overview of CT system identification, consider Markov parameter models and time moment models as simple linear in parameters models for CT system identification, bring them into mainstream model parameterization via basis functions, present a methodology to robustify the recursive least squares algorithm for parameter estimation of linear regression models, suggest a simple off-line error quantification scheme to show that it is possible to quantify error even in the absence of informative priors and indicate some directions for further research. This modest volume is intended to be a useful addition to the literature on identifying CT systems. *Piecenwise Constant Orthogonal Functions and Their Application to Systems and Control*, 1983 *Introduction To Control Systems, An (2nd Edition)* Kevin Warwick, 1996-01-31 This significantly revised edition presents a broad introduction to Control Systems and balances new modern methods with the more classical. It is an excellent text for use as a first course in Control Systems by undergraduate students in all branches of engineering and applied mathematics. The book contains a comprehensive coverage of automatic control, integrating digital and computer control techniques and their implementations, the practical issues and problems in Control System design, the three-term PID controller, the most widely used controller in industry today, numerous worked examples and end-of-chapter exercises. This second edition also includes an introductory guide to some more recent developments, namely fuzzy logic control and neural networks. **Neural Network Systems Techniques and Applications**, 1998-02-09 The book emphasizes neural network structures for achieving practical and effective systems and provides many examples. Practitioners, researchers, and students in industrial manufacturing, electrical, mechanical, and production engineering will find this volume a unique and comprehensive reference source for diverse application methodologies. Control and Dynamic Systems covers the important topics of highly effective Orthogonal Activation Function Based Neural Network System Architecture, multi-layer recurrent neural networks for synthesizing and implementing real

time linear control adaptive control of unknown nonlinear dynamical systems Optimal Tracking Neural Controller techniques a consideration of unified approximation theory and applications techniques for the determination of multi variable nonlinear model structures for dynamic systems with a detailed treatment of relevant system model input determination High Order Neural Networks and Recurrent High Order Neural Networks High Order Moment Neural Array Systems Online Learning Neural Network controllers and Radial Bias Function techniques Coverage includes Orthogonal Activation Function Based Neural Network System Architecture OAFNN Multilayer recurrent neural networks for synthesizing and implementing real time linear control Adaptive control of unknown nonlinear dynamical systems Optimal Tracking Neural Controller techniques Consideration of unified approximation theory and applications Techniques for determining multivariable nonlinear model structures for dynamic systems with a detailed treatment of relevant system model input determination Recent Trends In Applied Systems Research 1995 ,1995 **Stability and Stabilization of Nonlinear Systems** Dirk Aeyels,Francoise Lamnabhi-Lagarigue,Arjan van der Schaft,2008-01-26 These papers were presented at the first EC TMR Nonlinear Control Network Workshop on Stability and Stabilization of Nonlinear Systems that took place in March 1999 Ghent Belgium The TMR programme offers a unique opportunity for the academic community to expand their knowledge share their experience and identify and discuss strategic issues in aspects of nonlinear control engineering The aim is to create a resource centre of available expertise and research interests This outstanding reference volume presents current and emerging research directions including Stability analysis of nonlinear dynamical systems and converse Lyapunov theorems Stabilization and regulation of nonlinear dynamical control systems Control of physical systems using physics based Lyapunov functions and passivity as well as bifurcation analysis and optimal control This collection of peer reviewed papers provides a comprehensive overview of this field of research for graduate students and researchers in engineering and applied mathematics *College of Engineering* University of Michigan. College of Engineering,1978 *Systems, Controls, Embedded Systems, Energy, and Machines* Richard C. Dorf,2017-12-19 In two editions spanning more than a decade The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering Our knowledge continues to grow and so does the Handbook For the third edition it has expanded into a set of six books carefully focused on a specialized area or field of study Each book represents a concise yet definitive collection of key concepts models and equations in its respective domain thoughtfully gathered for convenient access Systems Controls Embedded Systems Energy and Machines explores in detail the fields of energy devices machines and systems as well as control systems It provides all of the fundamental concepts needed for thorough in depth understanding of each area and devotes special attention to the emerging area of embedded systems Each article includes defining terms references and sources of further information Encompassing the work of the world s foremost experts in their respective specialties Systems Controls Embedded Systems Energy and Machines features the latest developments the broadest scope of coverage and new material

on human computer interaction **Control and Dynamic Systems V14** C.T. Leonides,2012-12-02 Control and Dynamic Systems Advances in Theory and Applications Volume 14 provides information pertinent to the fundamental aspects of linear and nonlinear multi input multi output systems This book presents the development of analysis and synthesis of these complex systems that describes several important applied issues Organized into five chapters this volume begins with an overview of the basic issues in models for large scale engineering systems and other systems This text then examines the relations between model complexity or accuracy and system performance Other chapters consider the various significant systems modeling and control issues in nuclear reactors This book discusses as well the modeling issues and their methods that are fundamentally useful to the differential functional DF system The final chapter deals with complex many element power systems and presents techniques for such systems This book is a valuable resource for controls and systems engineers Aeronautic research workers will also find this book extremely useful *Reaction Diffusion Systems* Gabriela Caristi,2020-10-07 Based on the proceedings of the International Conference on Reaction Diffusion Systems held recently at the University of Trieste Italy Presents new research papers and state of the art surveys on the theory of elliptic parabolic and hyperbolic problems and their related applications Furnishes incisive contribution by over 40 mathematicians representing renowned institutions in North and South America Europe and the Middle East Walsh Functions in Signal and Systems Analysis and Design S. G. Tzafestas,1985-11-30 *An Introduction to Hybrid Dynamical Systems* Arjan J. van der Schaft,Hans Schumacher,2007-10-03 This book is about dynamical systems that are hybrid in the sense that they contain both continuous and discrete state variables Recently there has been increased research interest in the study of the interaction between discrete and continuous dynamics The present volume provides a first attempt in book form to bring together concepts and methods dealing with hybrid systems from various areas and to look at these from a unified perspective The authors have chosen a mode of exposition that is largely based on illustrative examples rather than on the abstract theorem proof format because the systematic study of hybrid systems is still in its infancy The examples are taken from many different application areas ranging from power converters to communication protocols and from chaos to mathematical finance Subjects covered include the following definition of hybrid systems description formats existence and uniqueness of solutions special subclasses variable structure systems complementarity systems reachability and verification stability and stabilizability control design methods The book will be of interest to scientists from a wide range of disciplines including computer science control theory dynamical system theory systems modeling and simulation and operations research

Unveiling the Magic of Words: A Overview of "**Orthogonal Functions In Systems And Control**"

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