Applied Optimal Estimation

Introduction to Optimal EstimationApplied Optimal EstimationOptimal EstimationOptimal Estimation of ParametersOptimal Estimation of Dynamic SystemsOptimal Estimation in Approximation TheoryOptimal Estimation in Approximation TheoryAn Introduction to Optimal EstimationOptimal Estimation of Dynamic Systems, Second EditionOptimal and Robust EstimationEstimation and Control for Networked Systems with Packet Losses without AcknowledgementOptimal Estimation, Identification, and ControlRandomness and Optimal Estimation in Data SamplingOptimal Estimation, Identification, and ControlDynamics and Control of Chemical Reactors, Distillation Columns and Batch Processes (DYCORD'95)The Cognitive NeurosciencesApplied Optimal EstimationSoil-vegetation-atmosphere Transfer Schemes and Large-scale Hydrological ModelsNASA Technical NoteOptimal Estimation and Information Fusion: Theory and Algorithms Edward W. Kamen The Analytic Sciences Corporation Frank L. Lewis Jorma Rissanen John L. Crassidis Charles Michelli Charles Michelli Paul B. Liebelt John L. Crassidis Frank L. Lewis Hong Lin Robert C. Lee M. Khoshnevisan, S. Saxena, H. P. Singh, S. Singh, F. Smarandache Robert C. K. Lee J.B. Rawlings Michael S. Gazzaniga Arthur Gelb A. J. Dolman Ming Lei

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a handy technical introduction to the latest theories and techniques of optimal estimation it provides readers with extensive coverage of wiener and kalman filtering along with a development of least squares estimation maximum likelihood and maximum a posteriori estimation based on discrete time measurements much emphasis is placed on how they interrelate and fit together to form a systematic development of optimal estimation examples and exercises refer to matlab software

this is the first book on the optimal estimation that places its major emphasis on practical applications treating the subject more from an engineering than a mathematical orientation even so theoretical and mathematical concepts are introduced and developed sufficiently to make the book a self contained source of instruction for readers without prior knowledge of the basic principles of the field the work is the product of the technical staff of the analytic sciences corporation tasc an organization whose success has resulted largely from its applications of optimal estimation techniques to a wide variety of real situations involving large scale systems arthur gelb writes in the foreword that it is our intent throughout to provide a simple and interesting picture of the central issues underlying modern estimation theory and practice heuristic rather than theoretically elegant arguments are used extensively with emphasis on physical insights and key questions of practical importance numerous illustrative examples many based on actual applications have been interspersed throughout the text to lead the student to a concrete understanding of the theoretical material the inclusion of problems with built in answers at the end of each of the nine chapters further enhances the self study potential of the text after a brief historical prelude the book introduces the mathematics underlying random process theory and state space characterization of linear dynamic systems

the theory and practice of optimal estimation is them presented including filtering smoothing and prediction both linear and non linear systems and continuous and discrete time cases are covered in considerable detail new results are described concerning the application of covariance analysis to non linear systems and the connection between observers and optimal estimators the final chapters treat such practical and often pivotal issues as suboptimal structure and computer loading considerations this book is an outgrowth of a course given by tasc at a number of us government facilities virtually all of the members of the tasc technical staff have at one time and in one way or another contributed to the material contained in the work

describes the use of optimal control and estimation in the design of robots controlled mechanisms and navigation and guidance systems covers control theory specifically for students with minimal background in probability theory presents optimal estimation theory as a tutorial with a direct well organized approach and a parallel treatment of discrete and continuous time systems gives practical examples and computer simulations provides enough mathematical rigor to put results on a firm foundation without an overwhelming amount of proofs and theorems

a comprehensive and consistent theory of estimation including a description of a powerful new tool the generalized maximum capacity estimator

most newcomers to the field of linear stochastic estimation go through a difficult process in understanding and applying the theory this book minimizes the process while introducing the fundamentals of optimal estimation optimal estimation of dynamic systems explores topics that are important in the field of control where the signals received are used to determine highly sensitive processes such as the flight path of a plane the orbit of a space vehicle or the control of a machine the authors use dynamic models from mechanical and aerospace engineering to provide immediate results of estimation concepts with a minimal reliance on mathematical skills the book documents the development of the central concepts and methods of optimal estimation theory in a manner accessible to engineering students applied mathematicians and practicing engineers it includes rigorous theoretial derivations and a significant amount of qualitiative discussion and judgements it also presents prototype algorithms giving detail and discussion to stimulate development of efficient computer programs and intelligent use of them this book illustrates the application of optimal estimation methods to problems with varying degrees of analytical and numercial difficulty it compares various approaches to help develop a feel for the absolute and relative utility of different methods and provides many applications in the fields of aerospace mechanical and electrical engineering

the papers in this volume were presented at an international symposium on optimal estimation in approximation theory which was held in freudenstadt federal republic of germany september 27 29 1976 the symposium was sponsored by the ibm world trade europe middle east africa corporation paris and ibm germany on behalf of all the participants we wish to express our appreciation to the spon sors for their generous support in the past few years the quantification of the notion of com plexity for various important computational procedures e g multi plication of numbers or matrices has been widely studied some such concepts are necessary ingredients in the quest for optimal or nearly optimal algorithms the purpose of this symposium was to present recent results of similar character in the field or ap proximation theory as well as to describe the algorithms currently being used in important areas of application of approximation theory such as crystallography data transmission systems cartography reconstruction from x rays planning of radiation treatment optical perception analysis of decay processes and inertial navigation system control it was the hope of the organizers that this con frontation of theory and practice would be of benefit to both groups whatever success th symposium had is due in no small part to the generous and wise scientific counsel of professor helmut werner to whom the organizers are most grateful dr t j rivlin dr p schweitzer ibm t j watson research center ibm germany scientific and education programs yorktown heights n y

optimal estimation of dynamic systems second edition highlights the importance of both physical and numerical modeling in solving dynamics based estimation problems found in engineering systems accessible to engineering students applied mathematicians and practicing engineers the text presents the central concepts and methods of optimal estimation theory and applies the methods to problems with varying degrees of analytical and numerical difficulty different approaches are often compared to show their absolute

and relative utility the authors also offer prototype algorithms to stimulate the development and proper use of efficient computer programs matlab codes for the examples are available on the book s website new to the second edition with more than 100 pages of new material this reorganized edition expands upon the best selling original to include comprehensive developments and updates it incorporates new theoretical results an entirely new chapter on advanced sequential state estimation and additional examples and exercises an ideal self study guide for practicing engineers as well as senior undergraduate and beginning graduate students the book introduces the fundamentals of estimation and helps newcomers to understand the relationships between the estimation and modeling of dynamical systems it also illustrates the application of the theory to real world situations such as spacecraft attitude determination gps navigation orbit determination and aircraft tracking

more than a decade ago world renowned control systems authority frank l lewis introduced what would become a standard textbook on estimation under the title optimal estimation used in top universities throughout the world the time has come for a new edition of this classic text and lewis enlisted the aid of two accomplished experts to bring the book completely up to date with the estimation methods driving today s high performance systems a classic revisited optimal and robust estimation with an introduction to stochastic control theory second edition reflects new developments in estimation theory and design techniques as the title suggests the major feature of this edition is the inclusion of robust methods three new chapters cover the robust kalman filter h infinity filtering and h infinity filtering of discrete time systems modern tools for tomorrow s engineers this text overflows with examples that highlight practical applications of the theory and concepts design algorithms appear conveniently in tables allowing students quick reference easy implementation into software and intuitive comparisons for selecting the best algorithm for a given application in addition downloadable matlab code allows students to gain hands on experience with industry standard software tools for a wide variety of applications this cutting edge and highly interactive text makes teaching and learning estimation methods easier and more modern than ever

this book discusses recent advances in the estimation and control of networked systems with unacknowledged packet losses systems usually known as user datagram protocol like it presents both the optimal and sub optimal solutions in the form of algorithms which are designed to be implemented easily by computer routines it also provides matlab routines for the key algorithms it shows how these methods and algorithms can solve estimation and control problems effectively and identifies potential research directions and ideas to help readers grasp the field more easily the novel auxiliary estimator method which is able to deal with estimators that consist of exponentially increasing terms is developed to analyze the stability and convergence of the optimal estimator the book also explores the structure and solvability of the optimal control i e linear quadratic gaussian control it develops various sub optimal but efficient solutions for estimation and control for industrial and practical applications and analyzes their stability and performance this is a valuable resource for researchers studying networked control systems especially those related to non tcp like networks the practicality of the ideas included makes it useful for engineers working with networked control

three important areas of process dynamics and control chemical reactors distillation columns and batch processes are the main topics of discussion and evaluation at the ifac symposium on dynamics and control of chemical reactors distillation columns and batch processes dycord 95 this valuable publication was produced from the latest in the series providing a detailed assessment of developments of key technologies within the field of process dynamics and control

the fourth edition of the cognitive neurosciences continues to chart new directions in the study of the biologic underpinnings of complex cognition the relationship between the structural and physiological mechanisms of the nervous system and the psychological reality of the mind the material in this edition is entirely new with all chapters written specifically for it book jacket

this book mainly focuses on the theme of optimizing estimation and sensor information fusion processing for stochastic dynamic systems it summarizes the basic theories and methods of optimizing estimation and information fusion direction including stochastic system models optimal estimation methods linear state estimation nonlinear state estimation information fusion models structures data processing methods data

association based on multi source data estimation and other aspects on the basis of years of teaching practice the author optimizes the content layout focuses on the basic theoretical methods of the subject emphasizes the systematic nature of the theory and the rigor of expression selectively cuts out some outdated content and introduces some important and widely accepted new developments in the subject on the other hand this book also serves as a reference material for technical developers in this field

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