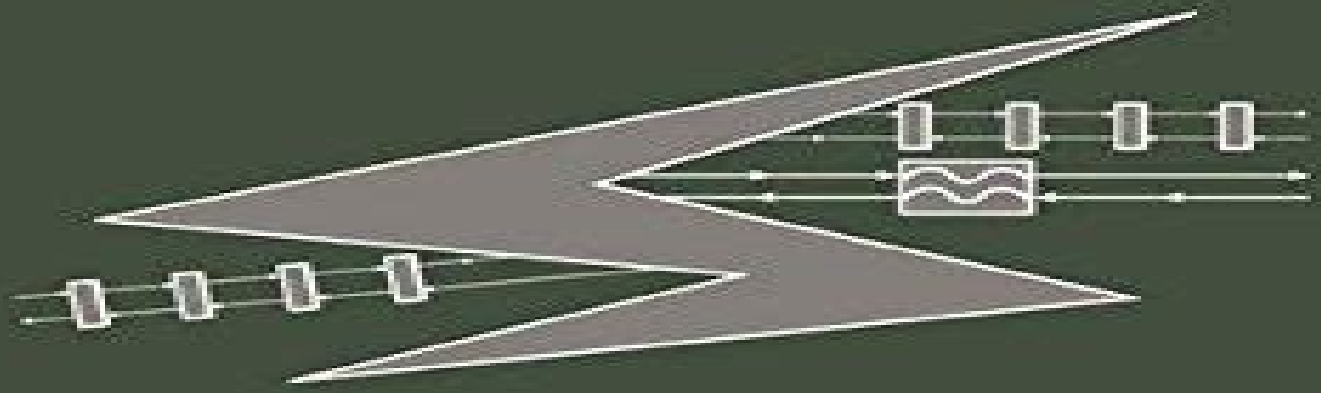
Systems & Control: Foundations & Applications

Hidenori Kimura

Chain-Scattering Approach to H^∞-Control



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Chainscattering Approach To H Infinity Control

Liansheng Tan

Chainscattering Approach To H Infinity Control:

Chain-Scattering Approach to H∞-Control Hidenori Kimura,2012-05-03 The advent of H control was a truly remarkable innovation in multivariable theory It eliminated the classical modern dichotomy that had been a major source of the long standing skepticism about the applicability of modern control theory by amalgamating the philosophy of classical design with computation based on the state space problem setting It enhanced the application by deepening the theory mathematically and logically not by weakening it as was done by the reformers of modern control theory in the early 1970s The purpose of this book is to provide a natural theoretical framework that is understandable with little mathematical background The notion of chain scattering well known in classical circuit theory but new to control theorists plays a fundamental role in this book It captures an essential feature of the control systems design reducing it to a J lossless factorization which leads naturally to the idea of H infinity control The J lossless conjugation an essentially new notion in linear system theory then provides a powerful tool for computing this factorization Thus the chain scattering representation the J lossless factorization and the J lossless conjugation are the three key notions that provide the thread of development in this book The book is completely self contained and requires little mathematical background other than some familiarity with linear algebra It will be useful to applied mathematicians and practicing engineers in control system design and as a text for a graduate course in H control and its applications **Chain-Scattering Approach to H∞Control** Hidenori Kimura,2012-12-06 Through its rapid progress in the last decade HOOcontrol became an established control technology to achieve desirable performances of con trol systems Several highly developed software packages are now avail able to easily compute an HOOcontroller for anybody who wishes to use HOOcontrol It is questionable however that theoretical implications of HOOcontrol are well understood by the majority of its users It is true that HOOcontrol theory is harder to learn due to its intrinsic mathemat ical nature and it may not be necessary for those who simply want to apply it to understand the whole body of the theory In general how ever the more we understand the theory the better we can use it It is at least helpful for selecting the design options in reasonable ways to know the theoretical core of HOOcontrol The question arises What is the theoretical core of HOO control I wonder whether the majority of control theorists can answer this ques tion with confidence Some theorists may say that the interpolation theory is the true essence of HOOcontrol whereas others may assert that unitary dilation is the fundamental underlying idea of HOOcontrol The J spectral factorization is also well known as a framework of HOOcontrol A substantial number of researchers may take differential game as the most salient feature of HOOcontrol and others may assert that the Bounded Real Lemma is the most fundamental building block

Extending H-infinity Control to Nonlinear Systems J. William Helton,Matthew R. James,1999-01-01 H infinity control originated from an effort to codify classical control methods where one shapes frequency response functions for linear systems to meet certain objectives H infinity control underwent tremendous development in the 1980s and made

considerable strides toward systematizing classical control This book addresses the next major issue of how this extends to nonlinear systems At the core of nonlinear control theory lie two partial differential equations PDEs One is a first order evolution equation called the information state equation which constitutes the dynamics of the controller One can view this equation as a nonlinear dynamical system Much of this volume is concerned with basic properties of this system such as the nature of trajectories stability and most important how it leads to a general solution of the nonlinear H infinity control problem **Nonlinear H-Infinity Control, Hamiltonian Systems and Hamilton-Jacobi Equations** M.D.S. Aliyu,2017-12-19 A comprehensive overview of nonlinear H control theory for both continuous time and discrete time systems Nonlinear H Control Hamiltonian Systems and Hamilton Jacobi Equations covers topics as diverse as singular nonlinear H control nonlinear H filtering mixed H2 H nonlinear control and filtering nonlinear H almost disturbance decoupling and algorithms for solving the ubiquitous Hamilton Jacobi Isaacs equations The link between the subject and analytical mechanics as well as the theory of partial differential equations is also elegantly summarized in a single chapter Recent progress in developing computational schemes for solving the Hamilton Jacobi equation HJE has facilitated the application of Hamilton Jacobi theory in both mechanics and control As there is currently no efficient systematic analytical or numerical approach for solving them the biggest bottle neck to the practical application of the nonlinear equivalent of the H control theory has been the difficulty in solving the Hamilton Jacobi Isaacs partial differential equations or inequalities In light of this challenge the author hopes to inspire continuing research and discussion on this topic via examples and simulations as well as helpful notes and a rich bibliography Nonlinear H Control Hamiltonian Systems and Hamilton Jacobi Equations was written for practicing professionals educators researchers and graduate students in electrical computer mechanical aeronautical chemical instrumentation industrial and systems engineering as well as applied mathematics economics and management

Chain-scattering Approach to H [infinity] Control Hidenori Kimura,1997 The purpose of this text is to provide a natural theoretical framework that is understandable for practitioners of control system design with little mathematical background **Nonlinear Control Systems Design 1995** A.J. Krener,D.Q. Mayne,2016-01-22 The series of IFAC Symposia on Nonlinear Control Systems provides the ideal forum for leading researchers and practitioners who work in the field to discuss and evaluate the latest research and developments This publication contains the papers presented at the 3rd IFAC Symposium in the series which was held in Tahoe City California USA Modeling, Estimation and Optimal Filtration in Signal Processing Mohamed Najim,2008-06-30 The purpose of this book is to provide graduate students and practitioners with traditional methods and more recent results for model based approaches in signal processing Firstly discrete time linear models such as AR MA and ARMA models their properties and their limitations are introduced In addition sinusoidal models are addressed Secondly estimation approaches based on least squares methods and instrumental variable techniques are presented Finally the book deals with optimal filters i e Wiener and Kalman filtering and adaptive filters such as the RLS the

LMS and their variants **Chain-Scattering Approach to H? Control** Hidenori Kimura,1996-12-01 *A Generalized Framework of Linear Multivariable Control* Liansheng Tan,2017-02-04 A Generalized Framework of Linear Multivariable Control proposes a number of generalized models by using the generalized inverse of matrix while the usual linear multivariable control theory relies on some regular models The book supports that in H infinity control the linear fractional transformation formulation is relying on the inverse of the block matrix If the block matrix is not regular the H infinity control does not apply any more in the normal framework Therefore it is very important to relax those restrictions to generalize the classical notions and models to include some non regular cases This book is ideal for scholars academics professional engineer and students who are interested in control system theory Presents a comprehensive set of numerical procedures algorithms and examples on how to deal with irregular models Provides a summary on generalized framework of linear multivariable control that focuses on generalizations of models and notions Introduces a number of generalized models by using the generalized inverse of matrix **Systems and Networks, Systems and Networks: Mathematical Theory and Applications** Uwe Helmke,Reinhard Mennicken,Josef Saurer,1994-09-06 The Symposium of the Mathematical Theory of Networks and Systems MTNS is an international event which is held biannually since 1973 MTNS 93 was the tenth meeting and the first one organized in Germany It took place in Regensburg in August 1993 The symposia focus attention on the mathematical foundations of systems control and circuit theory signal processing and their applications areas which are of vital interest for mathematicians and engineers The successful interaction between advanced mathematical methods and engineering problems is continuing to create an impressive body of theories and new results The first volume contains the key invited lectures presented at MTNS 93 The contributions are written by outstanding researchers working in the areas of the symposium They describe new developments in the theory and its applications presenting major new advances in linear and nonlinear control operator theoretic methods as well as modelling issues **International Aerospace Abstracts** ,1998 **Proceedings of the First Asian Control Conference, Tokyo Metropolitan Institute of Technology, Tokyo, July 27-30, 1994** ,1994 **Mathematical Reviews** ,2008 **American Book Publishing Record** ,1996-09 Bulletin of the Belgian Mathematical Society, Simon Stevin ,1998 **International Books in Print** ,1986 **International Mathematical News** ,1997 **Whitaker's Books in Print** ,1998 **Forthcoming Books** Rose Arny,1997 *Das Schweizer Buch* ,1997

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