Robust Stability Of Uncertain Singular Time Delay Systems

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DevOne Momentum - Serverless with Yan Cui*Robust Stability Of Uncertain Singular*

AbstractThis paper is concerned with the problem of delay-dependent robust

stability for uncertain discrete singular systems with time-varying delays. Without introducing the free-weighting matrice...

Robust stability for uncertain discrete singular systems ...

In this study, the robust stochastic stability problem for discrete-time uncertain singular Markov jump systems with actuator saturation is considered. A sufficient condition that guarantees that the discrete-time singular Markov jump systems with actuator saturation is regular, causal and stochastically stable is established.

Robust stability for discrete-time uncertain singular ...

The robust stability problem of continuous-time singular systems with multiple state delays and bounded parametric uncertainties is considered. Both commensurate and non-commensurate delays are investigated. On the basis of the linear fractional transformations (LFTs) framework and mu-analysis, a systematic approach is derived to convert the robustness problem to a robust nonsingularity problem.

Robust stability of uncertain singular time-delay systems ...

Abstract— This brief investigates the problem of robust D-stability anal-ysis for uncertain discrete singular systems with state delay and structured uncertainties. Sufficient conditions are developed to ensure that, when the nominal discrete singular delay system is regular, causal and all its finite poles are located within a specified disk, the uncertain system still pre-

Robust d-stability analysis for uncertain discrete ...

For a class of uncertain

discrete singular time-delay systems with norm-bounded parameter uncertainties and constant Manuscript The authors thank the anonymous referees for their helpful comments...

Delay-Dependent Robust Stability of Uncertain Discrete ...

The robust stability and stabilization, and H-infinity control problems for discrete-time Markovian jump singular systems with parameter uncertainties are discussed. Based on the restricted system equivalent (r.s.e.) transformation and by introducing new state vectors, the singular system

is transformed into a discrete-time Markovian jump standard linear system, and the linear matrix ...

Robust stability and H-infinity control for uncertain ...

The robust stability and robust stabilization for time-delay discrete singular systems with parameter uncertainties is discussed. A delay-dependent linear matrix inequality (LMI) condition for the time-delay discrete systems to be nonsingular and stable is given.

Delay-dependent robust stability and stabilization

for ...

Therefore, very recently, Xu and his associates , studied the robust D-stability (i.e., robust eigenvalue clustering in a specified circular region) problem of a linear discrete singular delay system with structured (elemental) parameter uncertainties. Here it should be emphasized that the robust D-stability analysis of linear uncertain discrete singular delay systems should consider not only the D-stability robustness but also system regularity and causality simultaneously.

Robust D-stability analysis

for linear uncertain discrete ...

[stabmarg,wcu] = robstab(usys) calculates the robust stability margin for an uncertain system. This stability margin is relative to the uncertainty level specified in usys. A robust stability margin greater than 1 means that the system is stable for all values of its modeled uncertainty. A robust stability margin less than 1 means that the system becomes unstable for some values of the uncertain elements within their specified ranges.

Robust stability of uncertain system - MATLAB

robstab

Robust stability is very important because of various uncertainties [21], and in this section we give the robust stability margins of the uncertain closed loop. By calculation, the robust stability margin for the H ∞ closed loop is 1.56, and the destabilizing frequency is 625.9 rad/s; the corresponding values are 6.29 and 346 rad/s for the μ closed loop. Their stability robustness margins greater than 1 mean that the uncertain system is stable for all values of its modeled uncertainty.

Robust Stability - an

overview | ScienceDirect Topics

First, a delay-dependent linear matrix inequality condition is obtained, which guarantees that the uncertain singular time-delay systems subject to actuator saturation are not only robustly exponential admissible, but also satisfy H ∞ performance γ via a tighter integral inequality and the method of free-weighting matrices.

IET Digital Library: H ∞ robust exponential stability and ...

Then, with this criterion, the problems of robust stability and robust

stabilization for uncertain discrete singular delay systems are solved, and the delay-dependent LMI conditions are obtained.

Robust Stability For Uncertain Discrete Singular Systems ...

Interest has grown recently in the stability analysis and control of singular systems with parameter uncertainties due to their frequent presence in dynamic systems, which is much more complicated than that of state-space systems because controllers must be designed so that the closed-loop system is not only robustly stable, but also regular and

impulse-free (in the continuous case) or causal (in the discrete case), while the latter two issues do not arise in the state-space case.

Robust Control and Filtering of Singular Systems ...

Abstract:In this study, the robust stochastic stability problem for discrete-time uncertain singular Markov jump systems with actuator saturation is considered. A sufficient condition that guarantees that the discrete-time singular Markov jump systems with actuator saturation is regular, causal and stochastically stable is established.

Robust stability for discrete-time uncertain singular ...

The purpose of the robust stability problem is to give conditions such that the uncertain singular system is regular, impulse free, and stable for all admissible un- certainties, while the purpose of robust stabilization is to design a state feedback control law such that the resulting closed-loop system is robustly stable.

Robust stability and stabilization for singular systems ...

The robust stochastic

stability, stabilization and H ∞ control for mode-dependent time-delay discrete Markovian jump singular systems with parameter uncertainties are discussed.

Robust stability and H∞ control for uncertain discrete ...

This paper deals with the problem of delay-dependent robust stability of a class of uncertain discrete singular time-delay systems. The considered systems are subject to norm-bounded parameter uncertainties and constant time delay. A new approach is introduced to take the relationship

between the fast and slow subsystems of a discrete singular time-delay system, based on which, a strict linear ...

Delay-Dependent Robust Stability of Uncertain Discrete ...

In this paper, the problem of robust preview control for uncertain discrete singular systems is considered. First of all, by employing the forward difference for uncertain discrete singular systems, the singular augmented error system with the state vector, the input control vector, and the previewable reference signal is derived.

This book deals with the application of new techniques based on multivariable control theory and optimisation theory to the study of robust stability of highly uncertain models of large interconnected power systems subject to real parameter variations. It focuses on the study of robust stability problems associated with parameter variations representing real physical quantities. The objective is to verify that critical system controllers of complex systems remain

stable and achieve desired performance objectives for all predefined power system variations at selected operating conditions along its expected operating trajectory. A second related objective is to determine the stability robustness with respect to changes in power system parameters and the maximum loading condition for which the system will remain stable.

This textbook aims to provide a clear understanding of the various tools of analysis and design for robust stability and performance of uncertain dynamic systems. In model-

based control design and analysis, mathematical models can never completely represent the “real world” system that is being modeled, and thus it is imperative to incorporate and accommodate a level of uncertainty into the models. This book directly addresses these issues from a deterministic uncertainty viewpoint and focuses on the interval parameter characterization of uncertain systems. Various tools of analysis and design are presented in a consolidated manner. This volume fills a current gap in published works by explicitly addressing the

subject of control of dynamic systems from linear state space framework, namely using a time-domain, matrix-theory based approach. This book also: Presents and formulates the robustness problem in a linear state space model framework. Illustrates various systems level methodologies with examples and applications drawn from aerospace, electrical and mechanical engineering. Provides connections between lyapunov-based matrix approach and the transfer function based polynomial approaches. Robust Control of Uncertain Dynamic Systems: A Linear State

Space Approach is an ideal book for first year graduate students taking a course in robust control in aerospace, mechanical, or electrical engineering.

Singular systems have been widely studied in the past two decades due to their extensive applications in modelling and control of electrical circuits, power systems, economics and other areas. Interest has grown recently in the stability analysis and control of singular systems with parameter uncertainties due to their frequent presence in dynamic systems, which is much more complicated than

that of state-space systems because controllers must be designed so that the closed-loop system is not only robustly stable, but also regular and impulse-free (in the continuous case) or causal (in the discrete case), while the latter two issues do not arise in the state-space case. This monograph aims to present up-to-date research developments and references on robust control and filtering of uncertain singular systems in a unified matrix inequality setting. It provides a coherent approach to studying control and filtering problems as

extensions of state-space systems without the commonly used slow-fast decomposition. It contains valuable reference material for researchers wishing to explore the area of singular systems, and its contents are also suitable for a one-semester graduate course.

Many plants have large variations in operating conditions. To ensure smooth running it is essential to find a simple fixed gain controller that guarantees rapidly decaying and well-damped transients for all admissible operating conditions. Robust Control presents design tools,

developed by the authors, for the solution of this design problem. Examples of simple and complex cases such as a crane, a flight control problem and the automatic and active four-wheel steering of a car illustrate the use of these tools. This book is intended for anyone who has taken an undergraduate course in feedback control systems and who seeks an advanced treatment of robust control with applications. Drawing on the resources and authoritative research of a leading aerospace institute, it will mainly be of interest to mechanical and electrical engineers in

universities, institutes and industrial research centres.

This monograph is an up-to-date presentation of the analysis and design of singular Markovian jump systems (SMJSs) in which the transition rate matrix of the underlying systems is generally uncertain, partially unknown and designed. The problems addressed include stability, stabilization, H∞ control and filtering, observer design, and adaptive control. applications of Markov process are investigated by using Lyapunov theory, linear matrix inequalities (LMIs),

S-procedure and the stochastic Barbalat's Lemma, among other techniques. Features of the book include: · study of the stability problem for SMJSs with general transition rate matrices (TRMs); · stabilization for SMJSs by TRM design, noise control, proportional-derivative and partially mode-dependent control, in terms of LMIs with and without equation constraints; · mode-dependent and mode-independent H∞ control solutions with development of a type of disordered controller; · observer-based controllers of SMJSs in which both the designed

observer and controller are either mode-dependent or mode-independent; · consideration of robust H∞ filtering in terms of uncertain TRM or filter parameters leading to a method for totally mode-independent filtering · development of LMI-based conditions for a class of adaptive state feedback controllers with almost-certainly-bounded estimated error and almost-certainly-asymptotically-stable corres ponding closed-loop system states · applications of Markov process on singular systems with norm bounded uncertainties and time-varying delays Analysis and

Design of Singular Markovian Jump Systems contains valuable reference material for academic researchers wishing to explore the area. The contents are also suitable for a one-semester graduate course.

Control and Dynamic Systems: Advances in Theory and Applications, Volume 50: Robust Control System Techniques and Applications, Part 1 of 2 is a two-volume sequence devoted to the issues and application of robust control systems techniques. This volume is composed of 10 chapters and begins with a presentation of the important techniques

for dealing with conflicting design objectives in control systems. The subsequent chapters describe the robustness techniques of systems using differential-difference equations; the design of a wide class of robust nonlinear systems, the techniques for dealing with the problems resulting from the use of observers in robust systems design, and the effective techniques for the robust control on non-linear time varying of tracking control systems with uncertainties. These topics are followed by discussions of the effective techniques for the robust control on non-linear time

varying of tracking control systems with uncertainties and for incorporating adaptive control techniques into a (non-adaptive) robust control design. Other chapters present techniques for achieving exponential and robust stability for a rather general class of nonlinear systems, techniques in modeling uncertain dynamics for robust control systems design, and techniques for the optimal synthesis of these systems. The last chapters provide a generalized eigenproblem solution for both singular and nonsingular system cases. These chapters also

look into the stability robustness design for discrete-time systems. This book will be of value to process and systems engineers, designers, and researchers.

Robustness analysis is considered for systems with structured uncertainty involving a combination of linear time-invariant and linear time-varying perturbations, and parametric uncertainty. A necessary and sufficient condition for robust stability in terms of the structured singular value p is obtained, based on a finite augmentation of the

original problem. The augmentation corresponds to considering the system at a fixed number of frequencies. Sufficient conditions based on scaled small-gain are also considered and characterized. A substantial amount of research in recent years has been devoted to analysis and synthesis of control systems o achieve robust stability and performance in the presence of structured uncertainty. This implies a decentralized nature of the uncertain perturbation, which is a reasonable modeling choice for complex systems, where uncertainty may be introduced at the subsystem

level (see Safonov [17] and Doyle [5] for early treatments of this). In addition t o this "spatial" structure, different assumptions can be made on the dynamic properties of the uncertainty: real parametric, linear time invariant (LTI), linear time varying (LTV) or nonlinear perturbations. All these uncertainty classes arise naturally in modeling. Parametric uncertainty appears frequently in first principles models; LTI perturbations are well suited when.

Singular time-delay systems are very suitable to

describe a lot of practical systems such as manufacturing systems, networked control systems, power systems and electrical circuits. Thus, the past two decades have witnessed a significant progress on the theory of singular time-delay systems, and many fundamental and important topics have been successfully investigated including stability analysis, stabilization, guaranteed cost control, filtering, observer design, sliding mode control and so on. The main objective of this book is to present the latest developments and references in the analysis

and synthesis of singular time-delay systems with or without Markov jumping parameters in a unified framework. The materials adopted in this book are mainly based on research results of the authors. This book will be of interest to academic researchers working in singular systems, time-delay systems and Markov jump systems and to graduate students interested in systems and control theory.

The two volume set, CCIS 288 and 289, constitutes the thoroughly refereed post-conference proceedings of the First International Conference on Communications

and Information Processing, ICCIP 2012, held in Aveiro, Portugal, in March 2012. The 168 revised full papers of both volumes were carefully reviewed and selected from numerous submissions. The papers present the state-of-the-art in communications and information processing and feature current research on the theory, analysis, design, test and deployment related to communications and information processing systems.

Proceedings of the European Control Conference 1995, Rome, Italy 5-8 September 1995