

附件 1

中国计量大学新增硕士研究生指导教师申请表

申请学科：应用数学

一、基本情况

姓 名	魏丽	性 别	女	出生年月	1983 年 2 月
最高学位及授予单位	博士 山东大学				
最高学历（包括毕业时间、学校、院（系））	博士 2012 年 12 月 山东大学 控制与工程学院				
职称，获得职称年月	讲师 2013 年 11 月				
主要研究方向	网络系统控制				
主要经历（包括学历和工作经历，从大学开始）					
自何年月	至何年月	部 门			任 职
2001 年 9 月	2005 年 6 月	曲阜师范大学			无
2005 年 9 月	2008 年 6 月	山东大学			无
2008 年 7 月	2012 年 12 月	山东大学			无
2013 年 5 月	至今	中国计量大学			无

二、本人主讲的研究生课程

时间	课程名称	学时数	学院 审核人
2017-2018-2	线性系统理论	32	

三、近几年有代表性的论文、专利、专著和获奖项目

序号	论文、专著、教材、获奖、制定标准名称	发表刊物、时间及 SCI、EI、收录，颁奖部门及奖励类别、等级	署名次序 (本人排名/ 作者人数)	学院 审核人
1	Quantized stabilization for stochastic discrete-time systems with multiplicative noises	International Journal of Robust and Nonlinear Control, 2013.1.1, 23(6): 591~601, SCI.	1/3	
2	Quantized output feedback control with multiplicative measurement noises	International Journal of Robust and Nonlinear Control, 2015.6.10, 25(9): 1338~1351, SCI.	1/3	
3	A new approach to quantized stabilization of stochastic system with multiplicative noise	Advances in Difference Equations, 2013.1.1, 20(1): 1~12,SCI.	1/2	

四、近几年本人负责或主要参加的有代表性的科研项目

项目名称及编号	项目来源	起止时间	经费 (万元)	署名次序 (本人排名/ 申请人数)	学院 审核人
互联网+供应链的建模及牛鞭效应控制问题研究	国家自然科学基金青年项目	2019, 01-2021, 12	26	1/7	
基于模型预测控制技术的切换系统的故障检测方法研究	国家自然科学基金青年项目	2018/01-2020/12	29	2/10	

五、已指导或协助指导研究生情况

年 级	研究生姓名	导师姓名	本人担任工作

RESEARCH

Open Access

A new approach to quantized stabilization of a stochastic system with multiplicative noise

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Abstract

A new quantization-dependent Lyapunov function is proposed to analyze the quantized feedback stabilization problem of systems with multiplicative noise. For convenience of the proof, only a single-input case is considered (which can be generalized to a multi-input channel). Conditions for the systems to be quantized mean-square poly-quadratically stabilized are derived, and the analysis of H_∞ performance and controller design is conducted for a given logarithmic quantizer. The most significant feature is the utilization of a quantization-dependent Lyapunov function, leading to less conservative results, which is shown both theoretically and through numerical examples.

Keywords: multiplicative noise; discrete-time systems; mean-square stability; logarithmic quantizer; Lyapunov function

1 Introduction

Rapid advancement of digital networks has witnessed a growing interest in investigating efforts of signal quantization on feedback control systems. The emerging network-based control system where information exchange between the controller and the plant is through a digital channel with limited capacities has further strengthened the importance of the study on quantized feedback control. Different from the classical control theory where data transmission is assumed to have an infinite precision, transmission subject to quantization or limited data capacity in digital networks, the tools in classical control theory may be invalid, so new tools need to be developed for the analysis and design of quantized feedback systems.

The study of quantized feedback control can be traced back to [1]. Most of the early research focuses on the understanding and mitigation of the quantization effects, while the quantization error is considered to impair the performance [2]. In modern control theory where the quantizer is always considered as an information encoder and decoder, one main problem is how much information has to be transmitted in order to make the system achieve a certain objective for the closed-loop system. For a discrete-time system with a single-input channel, when the static quantizer is considered, [3] shows the minimum data rate for the system to be stabilized is proved to be characterized by the unstable roots of the system matrix, and the coarsest quantizer is logarithmic. [4] considers the case when the input channel subject to Bernoulli packets dropouts, the minimum data rate is related not only to the unstable roots of the system matrix, but also with the packets dropout probability. As for a discrete-time system with single input subject to multiplicative noises

Quantized stabilization for stochastic discrete-time systems with multiplicative noises

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SUMMARY

This paper considers the problem of quadratic mean-square stabilization of a class of stochastic linear systems using quantized state feedback. Different from the previous works where the system is restricted to be deterministic, we focus on stochastic systems with multiplicative noises in both the system matrix and the control input. A static quantizer is used in the feedback channel. It is shown that the coarsest quantization density that permits stabilization of a stochastic system with multiplicative noises in the sense of quadratic mean-square stability is achieved with the use of a logarithmic quantizer, and the coarsest quantization density is determined by an algebraic Riccati equation, which is also the solution to a special stochastic linear control problem. Our work is then extended to exponential quadratic mean-square stabilization of the same class of stochastic systems. Copyright © 2011 John Wiley & Sons, Ltd.

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KEY WORDS: quantized feedback control; mean-square stability; stochastic system; multiplicative noises

1. INTRODUCTION

With the rapid advancement of digital networks, the problems of network time-delay, packet dropout, and quantization error (caused by limited data rate) arise for network-based feedback control systems. These problems can significantly deteriorate the performance of a control system, thus appropriate measures need to be taken in designing network-based control systems. Feedback control using quantized information can be traced back to 1960s (e.g., [1–5]). The development of modern network control systems has brought a resurgent interest in quantized feedback control. Recent works on quantized feedback control include [6–9].

The research on quantized feedback control can be categorized depending on whether the quantizer is static or dynamic. A static quantizer is a memoryless nonlinear function, whereas a dynamic quantizer involves memory and thus can be more complex but more powerful. Most of the research about static quantizers use either uniform or logarithmic quantization. A uniform quantizer can minimize the information loss, especially when the input signal falls into the dynamic range of the quantizer with a uniform distribution, and the number of quantization levels required for a given quantization step-size increases linearly as the dynamic range increases. A uniform quantizer is used in [10] to stabilize a linear time-invariant control system; [11] investigates the quantized H_∞ control problem for discrete-time systems with random packet losses; [12] studies the asymptotic characteristics of uniform scalar quantizers that are optimal with respect to some mean-squared error. But [13] shows that the uniform quantization approach is inappropriate when the quantization resolution is coarse or when the open-loop system is unstable.

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Quantized output feedback control with multiplicative measurement noises

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SUMMARY

In this paper, we consider the problem of quantized quadratic performance control for a class of stochastic systems, which are subject to multiplicative noises in the measurement. A dynamic output feedback controller is designed to guarantee a given level of performance. By using the sector bound approach to characterize the quantization error, the existence of a solution for the quantized quadratic performance control problem is found by solving the so-called guaranteed cost control problem of the associated system with a sector bounded uncertainty. We show that the latter problem can be solved using LMIs. Copyright © 2014 John Wiley & Sons, Ltd.

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KEY WORDS: quantized feedback control; quadratic mean-square stability; linear quadratic control

1. INTRODUCTION

Research on the problem of quantized feedback control can be traced back to 1956 [1], where Kalman investigated the effects of quantization in a sampled-data control system and pointed out that the quantized feedback system would exhibit limit cycles and chaotic behavior if a finite-alphabet quantizer is used. In the early works on quantized feedback control problem [2–5], the quantization error is always considered as undesirable, either as noise or state uncertainty, and most of the works try to eliminate its influence.

The widespread use of network-based control where the information between the system measurements and control input is exchanged through a network medium with a limited capacity has further strengthened the importance of the quantized feedback control problem. Different from the early views toward quantization, quantization is now considered to be useful instead of undesirable. As for the fundamental problem in networked control systems, how much is the least data rate that has to be sent to stabilize the system, [6] shows that the coarsest static quantizer for single-input deterministic systems to be stabilized via quantized state feedback is logarithmic, where the quantization density can be characterized by the unstable poles of the system matrix. The minimum quantization density with respect to state feedback subject to the Bernoulli packets dropouts is considered in [7], which is related to both the unstable modes and the statistical properties of Bernoulli noises. For the more general case with the input channel subject to an independent and identically distributed packet dropout process in [8], the minimum data rate for the mean-square stabilization is explicitly given in terms of the unstable eigenvalues of the open loop matrix and

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关于国家自然科学基金资助项目批准及有关事项的通知

魏丽 先生/女士：

根据《国家自然科学基金条例》的规定和专家评审意见，国家自然科学基金委员会（以下简称自然科学基金委）决定批准资助您的申请项目。项目批准号：

61803358，项目名称：互联网+供应链的建模及牛鞭效应控制问题研究，直接费用：26.00万元，项目起止年月：2019年01月至2021年12月，有关项目的评审意见及修改意见附后。

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附件：项目评审意见及修改意见表

国家自然科学基金委员会
信息科学部
2018年8月16日

关于国家自然科学基金资助项目批准及有关事项的通知

赵晓琪 先生/女士：

根据《国家自然科学基金条例》的规定和专家评审意见，国家自然科学基金委员会（以下简称自然科学基金委）决定批准资助您的申请项目。项目批准号：

61703384，项目名称：基于模型预测控制技术的切换系统的故障检测方法研究，直接费用：29.00万元，项目起止年月：2018年01月至2020年12月，有关项目的评审意见及修改意见附后。

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- 2、提交计划书电子修改版截止时间为**2017年9月18日16点**；
- 3、报送计划书纸质版截止时间为**2017年9月26日16点**。

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附件：项目评审意见及修改意见表

国家自然科学基金委员会
信息科学部
2017年8月17日



项目组主要参与者（注：项目组主要参与者不包括项目申请人）

编号	姓名	出生年月	性别	职 称	学 位	单位名称	电话	电子邮箱	证件号码	每年工作 时间（月）
1	魏丽	1983-02-05	女	讲师	博士	中国计量大学	0571-86914484	weilimaths@cjlu.edu.cn	370831198302052446	6
2	仲朝亮	1980-01-10	男	讲师	博士	杭州电子科技大学	18968045498	zhongchaoliang@hdu.edu.cn	320684198001105711	6
3	付世州	1985-08-26	男	讲师	博士	杭州电子科技大学	18767145246	fushizhou@hdu.edu.cn	410721198508260552	6
4	高国伟	1981-04-10	男	博士生	硕士	杭州电子科技大学	15093909763	gaoguowei@126.com	410503198104101017	7
5	高敬礼	1980-03-23	男	博士生	硕士	杭州电子科技大学	18368833319	gj1991@163.com	411381198003238216	7
6	徐永梅	1991-05-25	女	硕士生	学士	中国计量大学	13738095045	yongmeixu0411@163.com	371312199105255120	9
7	杨禅	1994-05-21	女	硕士生	学士	中国计量大学	15068733932	yangc0521@163.com	50038319940521598X	9
8	薛丽娟	1991-12-21	女	硕士生	学士	中国计量大学	18758239863	791205453@qq.com	341602199112213189	9
9	吴建村	1992-09-20	男	硕士生	学士	中国计量大学	13588292704	jiancunwu@163.com	340321199209204432	9

总人数	高级	中级	初级	博士后	博士生	硕士生
10		4	0		2	4