广东省数学/统计学博士生学术论坛（2017）

**会**

**议**

**手**

**册**

承办单位：中山大学数学学院

 举办时间：2017年12月1-3日

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# 论坛特邀报告人

 王凤雨  (天津大学，长江学者，国家杰青)

# 论坛学术委员会

**召集人**：

 郭先平（中山大学数学学院副院长，教授，博导）

**委 员**：（按姓氏笔画排序）

王凤雨（天津大学数学学院，教授，博导）

刘国欣（石家庄铁道大学,教授、博导）

李俊平（中南大学数学与统计学院，教授，博导）

杨启贵（华南理工大学数学学院，教授，博导）

罗交晚（广州大学数学学院，教授，博导）

柳向东（暨南大学经济学院，教授，博导）

郭上江（湖南大学数学与计量经济学院，教授，博导）

赵育求（中山大学数学学院，教授，博导）

袁平之（华南师范大学数学学院，教授，博导）

殷朝阳（中山大学数学学院，教授，博导）

黄元秋（湖南师范大学数学与计算机科学学院，教授，博导）

# 日程安排

**一、大会安排**

|  |  |  |
| --- | --- | --- |
| **地 点** | **时 间** | **大会议程** |
| 209报告厅 | **2日** | 08:00-08:30 | **开幕式** | 中山大学数学学院阮映东书记致欢迎词 |
| 08:30-09:00 | **特邀报告** | 王凤雨教授学术报告：漫谈随机分析的理论与应用主持人：郭先平 |

**二、博士生分组报告安排**

**第一组**

**地 点：**209报告厅

|  |  |  |  |
| --- | --- | --- | --- |
| **时 间** | **报告人** | **报告题目** | **主持人** |
|  | 09:00-09:30 | 陈玉惠（中山大学） | The optimal time decay rate of the compressible Navier-Stokes system in R3 | 赵育求 |
| 09:30-10:00 | 黄小敏（中山大学） | Asymptotic expansion of orthogonal polynomials via diﬀerence equations | 赵育求 |
| 休息10分钟 |
| 10:10-10:40 | 李金禄（中山大学） | Camassa-Holm 类方程和流体力学方程的适定性研究 | 殷朝阳 |
| 10:40-11:10 | 庄跃鸿（中山大学） | Asymptotic Behavior of Solutions of a Free-Boundary Tumor Model with Angiogenesis | 殷朝阳 |
| 11:10-11:40 | 梁凯豪（中山大学） | Compressed sensing with coherent tight frame and algorithm | 殷朝阳 |
| 12:00-15:00 午餐，**地点**：南草坪餐厅；午休 |
| 15:00-15:30 | 和炳（中山大学） | On completeness of the space of weighted Stepanov-like pseudo almost automorphic (periodic) functions | 杨启贵 |
| 15:30-16:00 | 余玉丰（中山大学） | Discriminative Multi-Scale Sparse Coding for Single-Sample Face Recognition with Occlusion | 杨启贵 |
| 16:00-16:30 | 李德芳（中山大学） | Face Synthesis Based on Deep Generative Model | 杨启贵 |
| 休息10分钟 |
| 16:40-17:10 | 李光洁（华南理工） | Quasi sure exponential stability of stochastic differential equations with variable delays driven by G-Brownian motion | 袁平之 |
| 17:10-17:40 | Danyao Wu（华南师大） | Permutation Trinomials over F2*m* | 袁平之 |
| 晚餐 休息 |

**第二组**

**地 点：**415报告厅

|  |  |  |  |
| --- | --- | --- | --- |
| **时 间** | **报告人** | **报告题目** | **主持人** |
| 2日 | 09:00-09:30 | 阳芬芬（天津大学） | Multi-valued backward stochastic differential equations driven by G-Brownian motion and its applications | 王凤雨 |
| 09:30-10:00 | 吕振华（湖南大学） | An extremal problem on 0-1 matrices | 王凤雨 |
| 休息10分钟 |
| 10:10-10:40 | 曾 珍（暨南大学） | Weak linear representation and robust test of m-estimation in GLMs with dependent errors | 柳向东 |
| 10:40-11:10 | 王雨溪（湖南师范） | The crossing numbers of Cartesian product of wheels with any tree | 黄元秋 |
| 11:10-11:40 | 邱焕焕（湖南大学） | Steady-states of one species chemotaxis model and global asymptotic stability of a two-species chemotaxis model | 郭上江 |
|  |  |  |  |
| 12:00-15:00 午餐，**地点**：南草坪餐厅；午休 |
| 2日 | 15:00-15:30 | 阮德豪（广州大学） | Stability of hybrid stochastic functional differential equations  | 罗交晚 |
| 15:30-16:00 | 张未未(惠州学院) | 随机产出下零售商的最优订购策略 | 罗交晚 |
| 16:00-16:30 | 霍海峰（中山大学） | Risk probability minimization problems for continuous Time Markov decision processes on finite horizon | 郭先平 |
| 休息10分钟 |
| 16:40-17:10 | 梁俊豪（中山大学） | The theory of moment truncation | 郭先平 |
| 17:10-17:40 | 索永强（中南大学） | Moderate Deviation and Central Limit Theorem for SDDEs with Polynomial Growth | 李俊平 |
| 晚餐 休息 |

12月3日（9:00-12:00）

博士生分组交流，地点：新数学楼219，新数学楼415

博士生导师研究生培养经验交流会，地点：新数学楼519

12月3日下午：会议结束

# 报告简介

**第一组**

**报告1**

题 目：

The optimal time decay rate of the compressible Navier-Stokes system in R3

报告人：陈玉惠

摘 要：

In this paper, we are concerned with the optimal time decay rates of the solution U for the compressible isentropic and non-isentropic Navier-Stokes system in R3and the solution U' for corresponding linearized equations, both with same initial date are smooth and small, we show that U − U' at L2 time decay rate (1 + t)− 5/4, which is faster than the rate (1 + t)− 3/4 for the linearized equation. Our method is combining the linear optimal decay rate of spectral analysis and the energy estimates.

**报告2**

题 目：

Asymptotic expansion of orthogonal polynomials via diﬀerence equations

报告人：黄小敏

摘 要：

This paper aims to develop a simple and uniﬁed technique in ﬁnding asymptotic expansion of orthogonal polynomials from their diﬀerence equations. By preserving the symmetry in the diﬀerence equation, we are able to express the higher-order terms in the asymptotic expansion as an integral whose integrand can be explicitly obtained by a recurrence relation,while the integration constant is to be determined by a matching condition relates to the initial conditions and coeﬃcients in the diﬀerence equation.

**报告3**

题 目：

Camassa-Holm 类方程和流体力学方程的适定性研究

报告人：李金禄

摘 要：

 本报告第一部分研究了 Camassa-Holm 类方程柯西问题的解对初值的连续依赖性; 第二部分研究了无磁场耗散的 MHD 方程柯西问题的解的局部存在唯一性; 第三部分研究了完全可压的 Navier-Stokes 方程柯西问题的小初值解的整体存在性; 第四部分研究了不可压的 Navier-Stokes 方程柯西问题的粘性极限过程。

**报告4**

题 目：

Asymptotic Behavior of Solutions of a Free-Boundary Tumor Model with Angiogenesis

报告人：庄跃鸿

摘 要：

We focus on a free boundary problem modeling the growth of solid tumor spheroid with angiogenesis. The model comprises a coupled system of two elliptic equations describing the distribution of nutrient concentration $\sigma$ and inner pressure $p$ within the tumor tissue. Angiogenesis results in a new boundary condition $\partial\_{\mathrm{n}}\sigma+\beta\left(\sigma-\overline{\sigma}\right)=0$ instead of the widely studied condition $\sigma = \overline{\sigma}$ over the moving boundary, where $\beta$ is a positive constant. We first prove that this problem admits a unique radial stationary solution, and this solution is globally asymptotically stable under radial perturbations. Then we establish local well-posedness of the problem and study asymptotic stability of the radial stationary solution under non-radial perturbations. A positive threshold value $\gamma\_\*$ is obtained such that the radial stationary solution is asymptotically stable for $\gamma>\gamma\_\*$ and unstable for $0<\gamma<\gamma\_\*.$

**报告5**

题 目:

Compressed sensing with coherent tight frame and algorithm

报告人： 梁凯豪

摘 要：

 We introduce a sufficient null space property under tight frame(sufficient D-NSP) to analysis compressed sensing with tight frame. We show that if measurement matrix $A$ satisfies sufficient D-NSP of order $s$, then a signal, which is $s$ sparse under the tight frame, could be exactly recovered. We give the relation of sufficient D-NSP and restricted isometric property (D-RIP) with tight frame, i.e., if a measurement matrix satisfies D-RIP of order $2bs$, then it also satisfies sufficient D-NSP of order $as$ with $a < b$ and $b$ is large enough. We prove the convergence of algorithm based on the sufficient D-NSP. In numerical experiments, we use discrete cosine transform (DCT), discrete Fourier transform (DFT) , and Haar wavelet to verify the effectiveness of this algorithm. With the raising of measurement number, the signal-noise ratio obtained by DCT, DFT, Haar wavelet increase stably.

**报告6**

题 目：

On completeness of the space of weighted Stepanov-like pseudo almost automorphic (periodic) functions

报告人：和炳

摘 要：

In this paper, we prove the completeness of the space of weighted Stepanov-like pseudo almost automorphic (periodic) functions under weak conditions. That is, for every $\rho \in \mathbb{U}\_{\infty }$, the space of weighted Stepanov-like pseudo almost automorphic (periodic) functions is complete under the norm $||\cdot ||\_{S^{p}}$.

**报告7**

题 目：

Discriminative Multi-Scale Sparse Coding for Single-Sample Face Recognition with Occlusion

报告人：余玉丰

摘 要：

The single sample per person (SSPP) face recognition is a major problem and it is also an important challenge for practical face recognition systems due to the lack of sample data information. To solve SSPP problem, some existing methods have been proposed to overcome the effect of variances to test samples in illumination,expression and pose. However, they are not robust when the test samples are with different kinds of occlusions. In this paper, we propose a discriminative multi-scale sparse coding (DMSC) model to address this problem. We model the possible occlusion variations via the learned dictionary from the subjects not of interest. Together with the single training sample per person, most of types of occlusion variations can be effectively tackled. In order to detect and disregard outlier pixels due to occlusion, we develop a multi-scale error measurements strategy, which produces sparse, robust and highly discriminative coding. Extensive experiments on the benchmark databases show that our DMSC is more robust and has higher breakdown point in dealing with the SSPP problem for face recognition with occlusion as compared to the related state-of-the-art methods.

**报告8**

题 目：

Face Synthesis Based on Deep Generative Model
报告人：李德芳

摘 要：

Face synthesis has been a fascinating yet challenging problem in computer vision and machine learning. Its main research effort is to design algorithms to generate photo-realistic face images via given semantic domain. Variational autoencoders and generative adversarial networks have emerged as two of the most popular deep generative models, have demonstrated to successfully approximate complex data distributions. In this talk, we provide a brief review of recent face synthesis works

that involve VAE and/or GAN.

**报告9**

题 目：

Quasi sure exponential stability of stochastic differential equations with variable delays driven by G-Brownian motion

报告人：李光洁

摘要:

In this talk, we investigate the quasi sure exponential stability of the nonlinear stochastic delay differential equation driven by G-Brownian motion (G-SDDE) with variables delays. We show that if the corresponding stochastic differential equation driven by G-Brownian motion (non-delay) of such equation is quasi surely exponentially stable, then there exists a positive constant $\bar{\tau}$ such that the G-SDDE is also quasi surely exponentially stable as long as the delay is bounded by $\bar{\tau}$. We also present some corollaries to illustrate the effectiveness of the obtained theory.

**报告10**

题 目：Permutation Trinomials over F2*m*

报告人：Danyao Wu

摘要:

Let *q* be a prime power, F*q* be the finite field of order *q*, and F*q*[*x*] be the ring of polynomials in a single indeterminate *x* over F*q*. A polynomial *f ∈* F*q*[*x*] is called a *permutation polynomial* (PP) of F*q* if it induces a one-to-one map from F*q* to itself.

**Deftnition 0.1.** *Two permutation polynomials f* (*x*) *and g*(*x*) *in* F*q*[*x*] *are called quasi- multiplicative (QM, for short) equivalence if there exists an integer* 1 *≤ d ≤ q −* 1 *with* gcd(*d, q −* 1) = 1 *and f* (*x*) = *ag*(*cxd*)*, where a, c ∈* F*∗q .*

Motivated by some recent results on permutation trinomials over F2*n* , we obtain all all permutation trinomials over F2*n* in Zieve’s paper [1]. We also show that some permutation trinomials over F2*n* are QM-equivalent. For example, let *m >* 1 be odd, *k* = *m*+1 , then for any *a, u, b ∈ F*2*∗m* ,

*f* (*x*) = *x* + *x*2*k −*1 + *x*2*k* +1*, g*(*x*) = *x* + *ax*2*k −*1 + *a*2*m−*2*k −*2*x*2*k* +1*,*

*h*(*x*) = *x* + *u*2*k−*1*−*1*x*2*k −*1 + *u*2*k−*1 *x*2*k* +1*, t*(*x*) = *x* + *ax*2*k −*1 + *a*2*k x*2*m−*2*k*+1+2*,*

$$f\_{1}\left(x\right)=x+b^{2^{k}-1}x^{2^{k}-1}+b^{2^{k}}x^{2^{k}+1} , f\_{2}\left(x\right)=x+ux^{2^{k}}+x^{2^{k}+2}+u^{2^{m}-2^{k}-2}x^{3\*2^{k}+4}$$

$$f\_{3}\left(x\right)=ux+x^{2^{k}+1}+u^{2^{m}-2^{k}-2}x^{2^{k+1}+3} , r\left(x\right)=x^{2^{k}}+x^{2^{k}+2}+x^{3\*2^{k}+4}$$

are permutation trinomials over *F*2*m* , and they are QM-equivalent.

**第二组**

**报告1**

题 目：

Multi-valued backward stochastic differential equations driven by G-Brownian motion and its applications

报告人：阳芬芬

摘 要：

In this paper, we prove the existence and uniqueness of a solution for a class of backward stochastic differential equations driven by G-Brownian motion with subdifferential operator by means of the Moreau–Yosida approximation method. Moreover, we give a probabilistic interpretation for the viscosity solutions of a kind of nonlinear variational inequalities.

**报告2**

题 目：

An extremal problem on 0-1 matrices

报告人：吕振华

摘 要：

 Let n  and k  be integers larger than or equal to 2. What is the maximum number of nonzero entries in an  matrix A of order n  such that both A  and A^k  are 0-1 matrices? Characterize the matrices that attain the maximum number. This is joint work with Zejun Huang, Pu Qiao

**报告3**

题 目：

Weak linear representation and robust test of m-estimation in GLMs with dependent errors

报告人：曾珍

摘 要：

Generalized linear models(GLMs), which have been introduced by Nelder and Wedderbum(1972), are widely used in data analysis. In this paper we consider the model



where the dependent errors defined as



is a continuous differentiable function, are independent and identicallydistributed (i.i.d.) random errors with zero mean and finite variance，is a measurable function.

 We show the linear representation and asymptotic normality of the estimator, which extend the correspondingly results of Wu et al. (M-estimation of linear models with dependent errors. The Annals of Statistics, 2007) to GLMs. We also present robust version of the likelihood -ratio test statistic for this model . Under the error hypothesis and general linear hypothesis, their asymptotic distributions of the robust test are derived.At last, some examples are proposed to illustrate the results .

**报告4**

题 目：

The crossing numbers of Cartesian product of wheels with any tree

报告人：王雨溪

摘 要：

The crossing number is a classic invariant of a graph. Figuratively speaking, it is an invariant which measures how far it is from a plane graph. In [D. Bokal, On the crossing numbers of Cartesian products with trees, J. Graph Theory 56(4) (2007) 287-300.], Bokal proved the crossing numbers of the Cartesian product of the wheel  and all trees T with maximum degree at most three. However, we get the crossing numbers of the Cartesian product of the wheel  () with any tree T. We also show that the crossing number of  by modifying a drawing of the graph.

**报告5**

题 目：

Steady-states of one species chemotaxis model and global asymptotic stability of a two-species chemotaxis model

报告人：邱焕焕

摘 要：

Reaction-diﬀusion systems with chemotaxis under Neumann initial-boundary condition are considered. Firstly, for a stationary Lesie-Gower competition model, some suﬃcient conditions ensuring the existence of nonconstant solutions are obtained by the Leray-Schauder degree theory.In the simpliﬁed 1D case, the global bifurcation structure of nonconstant solutions of a limiting system, which is derived when diﬀusion and advection tend to inﬁnity, is classiﬁed depending on the coeﬃcients. For the two species chemotaxis model, the global boundedness is obtained by some priori estimates. By constructing a Lyapunov function and a routine analysis of the linearized equation, some suﬃcient conditions ensuring the global asymptotic stability are obtained.

**报告6**

题 目：

Stability of hybrid stochastic functional differential equations

报告人：阮德豪

摘要：

 In this paper, a class of hybrid stochastic functional differential equations is investigated. Under some suitable assumptions, the $p$th moment stability, asymptotic stability and exponential stability are discussed by means of constructing an auxiliary functional differential equation and using the comparison principle. The proposed criteria removes some conditions in some earlier publications. Moreover, two examples are given to illustrate our results.

**报告7**

题 目：

随机产出下零售商的最优订购策略

报告人：张未未

摘 要：

经典报童模型假设零售商风险中性, 得到的最优订购策略和现实中零售商的实际订购量存在较大的偏差. Eeckhoudt et al. (1995) 研究表明, 用常用的效用函数来描述零售商的风险厌恶偏好可得最优订购量随着商品零售价的增加而降低, 本文研究在面临随机产出风险及二次订购选择权, 具有递减风险厌恶效用的损失厌恶零售商的最优订购策略, 目标是最大化损失厌恶零售商的期望效用.

首先对此模型在一般效用函数下讨论了最优订购策略存在的条件及满足的方程, 然后分别在线性效用和幂效用两种情形下具体讨论了最优订购策略的存在唯一性, 及最优订购策略对模型参数的敏感度分析, 除此之外我们还讨论了供应风险对零售商的常规订购收益的影响, 进而将模型扩展到更符合现实的二次订购批发价格与商品单位残值均依赖随机产出的情形, 并具体求解了最优订购量, 最后给出了数值算例分析，直观地展示了供给风险, 二次订购成本及损失厌恶和风险厌恶对最优策略及期望收益效用的影响.

**报告8**

题 目：

Risk probability minimization problems for continuous Time Markov decision processes on finite horizon

报告人：霍海峰

摘要:

This paper deals with the risk probability minimization problem for the finite horizon continuous-time Markov decision process with unbounded transition rates and history dependent policies.Only using the assumption of non-explosion of the controlled state processes as well as the finiteness of actions available at each state, we not only establish the existence and uniqueness of a solution to the corresponding optimality equation, prove the existence of an optimal policy, but also provide an value iteration algorithm for computing both the value function and an optimal policy. Finally, we give two examples to illustrate our results: one example is the numerical calculation of the value function and an optimal policy, and the other shows the difference between the conditions in this paper and those in the previous literature.

**报告9**

题 目：

The theory of moment truncation

报告人**：**梁俊豪

摘 要**：**

 Moments (such as mean, variance, etc.) are the dominant statistics for studying a probability distribution. Moment equations are widely used to approximately model the stochastic dynamics of empirical systems. However, the moment equations derived from general stochastic differential equations are often infinitely coupled, causing theoretical analysis and numerical computation infeasible, so that truncation is required. Here, we propose a new moment truncation scheme, the binomial moment equation (BME) method. The BME is a linear moment closure scheme, which not only offers an effective numerical method for approximately computing the probability density function, but also provides a noise-reduced approximation method for theoretically studying nonlinear dynamical systems with strong noise. This analytic and numerical tool can be applied to a wide class of nonlinear stochastic systems in physics, biology, chemistry and other fields, particularly to those with strong noise for which traditional theories may fail.

**报告10**

题 目：

Moderate Deviation and Central Limit Theorem for SDDEs with Polynomial Growth

报告人：索永强

摘 要：

In this paper, employing the weak convergence method, based on a variational representation for expected values of positive functionals of a Brownian motion or a general poisson random measure, we investigate moderate deviation for a class of stochastic differential delay equations with small noises, where the coefficients are allowed to be of polynomial growth with respect to the delay variables. Moreover, we obtain the central limit theorem for stochastic differential delay equations involved.

# 论坛会务

**一、会务人员及联系方式**

段洁馨： 020-84115535，13427613527；

吴 慧 : 15823088969

梅云河： 18826227429

杜 曼： 13246823529

杨光锐： 13580447167

**二、温馨提示**

1. 外地师生外出时，请保持手机畅通，并结伴而行；

2. 备用电话

中山大学广州校区南校园（举办论坛所在校园）

 校医院急诊 020-84113093，

新珠江大酒店：020-34255335

保卫处报警 020-84111234 020-87333110

南草坪餐厅 020-84113682