第六届分枝过程及相关课题（网络）研讨会

The 6th Workshop(Web) on Branching Processes and Related Topics

会议手册

北京师范大学

2020年10月10日–10月11日

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General Information 会议指南

- 会议时间：2020年10月10日–2020年10月11日

- 会议平台：腾讯会议

    —10月10日：

* 会议主题：第六届分枝过程及相关课题（网络）研讨会(1010)

* 会议ID：194 910 283

* 会议链接：https://meeting.tencent.com/s/0ah5LB8LWBDe

    —10月11日：

* 会议主题：第六届分枝过程及相关课题（网络）研讨会(1011)

* 会议ID：708 740 306

* 会议链接：https://meeting.tencent.com/s/n71VW47yhGsJ

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Programs 会议日程

2020年10月10日(周六)				
时间	报告人	报告题目		主持人
9：20-9：30	开幕式-致欢迎辞			
9：30-10：00	周晓文	Extinguishing behaviors for a class of continuous-state nonlinear branching processes		金鹏
10：00-10：30	张树雄	On large deviation probabilities for empirical distribution of the branching random walk with heavy tails		
10：30-10：50	break			
10：50-11：20	金鹏	Long time behavior of affine processes		张树雄
11：20-11：50	季丽娜	Construction of age-structured branching processes by stochastic equations		
时间	报告人	报告题目		主持人
14：30-15：00	孙振尧	Stable Central Limit Theorems for Super OU Processes		孙琪
15：00-15：30	蒲飞	Ergodicity and central limit theorems for parabolic Anderson model with delta initial condition		
15：30-15：50	break			
15：50-16：20	孙琪	Lower deviations for supercritical branching processes with immigration		孙振尧

2020年10月11日(周日)			
时间	报告人	报告题目	主持人
9：30-10：00	李豆豆	Harmonic moments and large deviations for a critical Galton-Watson process with immigration	王华明
10：00-10：30	杨叙	Boundary behaviors for a class of continuous-state nonlinear branching processes in critical cases	
10：30-10：50		break	
10：50-11：20	王华明	Two-type linear-fractional branching processes in varying environments with asymptotically constant mean matrices	杨叙
11：20-11：50	张小玥	Limit theorems for the minimal position of a branching random walk in random environment	

时间	报告人	报告题目	主持人
14：30-15：00	朱庆三	Critical Branching Random Walks, Branching Capacity and Branching Interlacements	张小玥
15：00-15：30	刘会利	A Generalized Stepping Stone Model with Ξ-resampling Mechanism	

Abstracts 会议摘要

Extinguishing behaviors for a class of continuous-state nonlinear branching processes

周晓文, Xiaowen Zhou

康考迪亚大学　Email: xiaowen.zhou@concordia.ca

Abstract: In this talk we consider a class of continuous-state nonlinear branching processes obtained from general Lamperti transform of spectrally positive Levy processes. Such a process becomes extinguishing if it converges to 0 but never reaches 0 as time goes to infinity. To understand how slow it converges to 0 during extinguishing，we prove different modes of convergence on the rescaled first passage times of levels that decrease to 0. The talk is based on joint work with Junping Li and Yingchun Tang.

On large deviation probabilities for empirical distribution of the branching random walk with heavy tails

张树雄, Shuxiong Zhang

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Abstract: Given a branching random walk $\{Z_n\}_{n\geq 0}$ on $\mathbb{R}$, let $Z_n(A)$ be the number of particles located in interval A at generation n. It is well known that under some mild conditions, $Z_n(\sqrt{n}A)/Z_n(\mathbb{R})$ converges a.s. to $\nu(A)$ as $n \to \infty$, where ν is the standard Gaussian measure. In this work, we investigate its large deviation probabilities under the condition that the step size or offspring law has heavy tail, i.e. the decay rate of

$$\mathbb{P}(Z_n(\sqrt{n}A)/Z_n(\mathbb{R}) > p),$$

where $p \in (\nu(A), 1)$.

Long time behavior of affine processes

金鹏, Peng Jin

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Abstract: Affine processes are Markov processes for which the logarithm of the characteristic function of its transition distribution $P_t(x, \cdot)$ is affine with respect to the initial state x. Affine processes have found a wide range of applications in finance, due to their computational tractability and modeling flexibility. Many popular models in finance, such as the models of Cox et al., Heston and Vasicek, are of affine type. A systematic treatment of affine processes was given in the seminal work of Duffie, Filipovic and Schachermayer. In this talk I will present our recent results on the long time behavior of affine processes, concentrating on their stationarity and exponential ergodicity. This talk is based on a series of joint works with Martin Friesen, Jonas Kremer and Barbara Rüdiger.

Construction of age-structured branching processes by stochastic equations

季丽娜, Lina Ji

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Abstract: We give constructions of age-structured branching particle systems and superprocesses without or with immigration as pathwise unique solutions stochastic integral equations. The ergodicities of the models with immigration are also studied.

Stable Central Limit Theorems for Super OU Processes

孙振尧, Zhenyao Sun

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Abstract: We study the asymptotic behavior of a class of supercritical super Ornstein-Ulenbeck processes X_t with branching mechanisms of infinite second moment. We establish the stable central limit theorem for $X_t(f)$ for all functions f with polynomial growth. This is a joint work with Yan-Xia Ren，Renming Song and Jianjie Zhao.

Ergodicity and central limit theorems for parabolic Anderson model with delta initial condition

蒲飞, Fei Pu

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Abstract: Let $\{u(t,x)\}_{t>0,x\in\mathbb{R}}$ denote the solution to the parabolic Anderson model with initial condition δ_0 and driven by space-time white noise on $\mathbb{R}_+ \times \mathbb{R}$, and let $p_t(x) := (2\pi t)^{-1/2}\exp\{-x^2/(2t)\}$ denote the standard Gaussian heat kernel on the line. We prove that the random field $x \mapsto u(t,x)/p_t(x)$ is ergodic for every $t > 0$. And we establish an associated quantitative central limit theorem using Malliavin-Stein method. This is based on joint work with Le Chen, Davar Khoshenvisan and David Nualart.

Lower deviations for supercritical branching processes with immigration

孙琪, Qi Sun

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Abstract: For a supercritical branching processes with immigration Z_n, it is known that under suitable conditions on the offspring and immigration distributions, Z_n/m^n converges almost surely to a finite and strictly positive limit, where m is the offspring mean. We are interested in the limiting properties of $P(Z_n = k_n)$ with $k_n = o(m^n)$ as $n \to \infty$. give asymptotic behavior of such lower deviation probabilities in both Schröder and Böttcher cases, unifying and extending the previous results for non-immigration cases in literature. This talk is based on joint work with Mei Zhang.

Harmonic moments and large deviations for a critical Galton-Watson process with immigration

李豆豆, Doudou Li

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Abstract: In this talk, a critical Galton-Watson branching process with immigration $\{Z_n, n \geq 0\}$ is studied. We first obtain the convergence rate of the harmonic moment of Z_n. Then the large deviation of $S_{Z_n} = \sum_{i=1}^{Z_n} X_i$ is obtained, where X_i is a sequence of independent and identically distributed zero-mean random variables with tail index $\alpha > 2$. We shall see that the converging rate is determined by the immigration mean, the variance of reproducing and the tail index of X_1^+, comparing to previous result for supercritical case, where the rate depends on the Schröder constant and the tail index. This is a joint work with Professor Mei Zhang.

Boundary behaviors for a class of continuous-state nonlinear branching processes in critical cases

杨叙, Xu Yang

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Abstract: Using Foster-Lyapunov techniques we establish new conditions on non-extinction, non-explosion, coming down from infinity and staying infinite, respectively, for the general continuous-state nonlinear branching processes introduced in Li et al. (2019). These results can be applied to identify boundary behaviors for the critical cases of the above nonlinear branching processes with power rate functions driven by Brownian motion and (or) stable Poisson random measure, which was left open in Li et al. (2019). In particular, we show that even in the critical cases, a phase transition happens between coming down from infinity and staying infinite. This talk is based on a joint work with Shaojuan Ma and Xiaowen Zhou.

Two-type linear-fractional branching processes in varying environments with asymptotically constant mean matrices

王华明, Huaming Wang

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Abstract: Consider two-type linear-fractional branching processes in varying environments with asymptotically constant mean matrices. Let ν be the extinction time. Under certain conditions, we show that $\mathbb{P}(\nu = n)$ is asymptotically the same as some function of the product of spectral radiuses of the mean matrices. We also give an example for which $\mathbb{P}(\nu = n)$ decays with various speeds such as $\frac{c}{n(\log n)^2}, \frac{c}{n^\beta}, \beta > 1$ et al. which are vary different from the ones of homogeneous multitype Galton-Watson processes.

Limit theorems for the minimal position of a branching random walk in random environment

张小玥, Xiaoyue Zhang

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Abstract: We consider a branching system of N-valued random walks with a random environment in location. We will give the exact limit value of $\frac{M_n}{n}$, where M_n denotes the minimal position of the branching random walk at time n. A key step in the proof is to transfer our branching random walks with a random environment in location to branching random walks with a random environment in time, by use of Bramson's "branching processes within a branching process" (1978).

Critical Branching Random Walks, Branching Capacity and Branching Interlacements

朱庆三, Qinsan Zhu

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Abstract: We concern critical branching random walks and introduce branching capacity and related subjects. By introducing these new concepts, we can obtain analogues of various classical results for random walks.

A Generalized Stepping Stone Model with Ξ-resampling Mechanism

刘会利, Huili Liu

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Abstract: In this paper we formulate a generalized stepping stone model with Ξ-resampling mechanism to describe the evolution of relative frequencies for different types of alleles in a population with migration between two colonies. For a Ξ-coalescent and a jump type mutation generator A, such a probability-measure-valued Markov process is dual to the (Ξ, A)-coalescent process with geographical labels and migration. The existence of the generalized stepping stone model is directly established from a moment duality by verifying a multidimensional Hausdorff moment problem, and its probability law is also uniquely determined by the moment duality. Further, we characterize the stationary distribution for this model and show that the model is not reversible when the mutation operator is of uniform type. This talk is based on a joint work with Xiaowen Zhou.