随机数学及其应用研讨会
暨
2023 年度随机中心年会

线下：北师大后主楼1124　线上：腾讯会议（ID: 170-970-597，密码: 123456）

2024年1月8日（周一）			
报告时间	**报告人**	**报告题目**	**主持人**
08:20-08:30	**开 场 词（陈木法院士）**		毛永华
08:30-09:00	陈昕昕	Conditioned branching random walk and related problems	
09:00-09:30	陈增彩	Large deviation for maximum of two speed branching Brownian motion	
09:30-10:00	姚　丹	Quasi-stationary distributions for subcritical branching Markov chains	
10:00-10:20	中场休息及交流		
10:20-10:50	程子苓	Remaining-lifetime age-structured branching processes	马宇韬
10:50-11:20	廖仲威	Stability and Mean Growth of Stochastic Solow Growth Models with Jump	
11:20-11:50	王颖喆	2023年年度总结报告	
报告时间	**报告人**	**报告题目**	**主持人**
14:00-14:30	杜　倩	The existence of quasi-stationary distribution for Markov chains	何　辉
14:30-15:00	蒲　飞	On the association of the Airy one process	
15:00-15:30	马宇韬	长条形beta系综	
15:30-15:50	中场休息及交流		
15:50-16:20	谭江睿	Limiting behaviors of supercritical Galton-Watson processes ——from finitely many types to countably many types	蒲　飞
16:20-16:50	赵　奕	On some classical problems about upward uniformly finite range Markov jump processes	
16:50-17:20	毛永华	Markov 链的起源与发展及其应用	

Conditioned branching random walk and related problems

Xinxin CHEN 陈昕昕 *Beijing Normal University*

Abstract:We consider a supercritical branching random walk on the real line in the so called $\kappa-$case where the whole system a.s. goes to $+\infty$ eventually, and the additive martingale converges a.s. and in mean to some non-degenerate random variable W_∞ under suitable moment condition. We study the asymptotical behaviors of the branching random walk conditioned on large W_∞. We will also discuss several related problems on martingale limits and conditioned laws.

Large deviation for maximum of two speed branching Brownian motion

Zengcai CHEN 陈增彩（博三，导师：何辉） *Beijing Normal University*

Abstract: For variable speed branching Brownian motion, it has been shown in Bovier and Hartung (2014, 2015) that the maximum position M_t of all particles alive at time t, suitably centred by a deterministic function m_t, converge weakly. In this talk, we are interested in the decay rate of the following upper large deviation probability, as $t \to \infty$,

$$\mathbb{P}(M_t \geq \alpha m_t), \quad \alpha > 1.$$

For simplicity, we only consider the case that the speed is σ_1 for $s \leq bt$ and σ_2 for $bt < s \leq t$. For $\sigma_1 < \sigma_2$, the decay rate function is the same to regular branching Brownian motion. For $\sigma_1 > \sigma_2$, the decay rate function exhibits a phase transition depending on a certain relation between α and σ_2. This is a joint work with Xinxin Chen, Lisa Hartung and Hui He.

Quasi-stationary distributions for subcritical branching Markov chains

Dan YAO 姚丹（博三，导师：洪文明） *Beijing Normal University*

Abstract: We consider a subcritical branching Markov chain. Let Z_n be the counting measure of particles of generation n. Under some conditions, we use the moment problem to prove the Yaglom limit of (Z_n) exists, this approach relies on the many-to-few formula. We also give explicit integral representations of all quasi-stationary distributions of (Z_n), whose proof is probabilistic and doesn't rely on Martin boundary theory. This is a joint work with Wenming Hong.

Remaining-lifetime age-structured branching processes

Ziling CHENG 程子苓（博三，导师：李增沪） *Beijing Normal University*

Abstract: We study age-structured branching models with reproduction law depending on the remaining lifetime of the parent. The lifespan of an individual is decided at its birth and its remaining lifetime decreases at the unit speed. The models without or with immigration are constructed as measure-valued processes by pathwise unique solutions of stochastic equations driven by time-space Poisson random measures. In the subcritical branching case, we give a

sufficient condition for the ergodicity of the process with immigration. Two large number laws and a central limit theorem of the occupation times are proved.

Stability and Mean Growth of Stochastic Solow Growth Models with Jump

Zhongwei LIAO 廖仲威 *Beijing Normal University at Zhuhai*

Abstract: This work focuses on stochastic Solow growth models with uncertainties from technology and environmental variation. The uncertainty of technological progress is driven by L é vy processes, which include continuous perturbation and jump growth, while the uncertainty of environmental variability is characterized by Markov chains. First, in fixed environment, we introduce the criterion of stochastic stability and explicitly compute the mean growth rates of capital, total output and capital-labor ratio. Next, taking environmental variation into account, we describe the recurrence of the regime-switching process, and then give the rate of convergence of the system to its stationary distribution and the asymptotic boundedness of pth moment. Finally, a computable example is proposed, which is an economic system with negative and positive environments, to illustrate the effectiveness of our results. This work reveals the impact of various random effects on the main economic quantities and provides insight on stability and mean growth rates of stochastic Solow growth models with uncertainties from technology and environment.

2023年年度总结报告

Yinzhe WANG 王颖喆*Beijing Normal University*

Abstract: 针对2023年的各项工作和成果进行简要汇报.

The existence of quasi-stationary distribution for Markov chains

Qian DU 杜倩（博三，导师: 毛永华） *Beijing Normal University*

Abstract: For the discrete-time Markov chain or jump process, there exists the unique R-invariant measure up to constant multiples when the chain is R-recurrent or the process is λ-recurrent. We give the moment condition for this R-invariant measure to be a quasi-stationary distribution, while the moment condition is also given for R-positive recurrence. When the states absorbed in one step are finite, the R-recurrence is equivalent to the existence of quasi-stationary distribution. Sufficient condition is also provided for quasi-stationary distribution when the exit states are infinite. For λ-recurrent jump process, we construct its λ-invariant measure through the equivalence of λ-recurrence between jump process and its "λ-embedded'' chain. And we represent the λ-invariant measure to get the analogy results as in discrete-time Markov chains.

On the association of the Airy one process

Fei PU 蒲飞 *Beijing Normal University*

Abstract: We first show that the Airy one process is associated using the association of stochastic heat equationa and convergence of of KPZ equation to KPZ fixed point. Then we apply Newman's inequality to establish the ergodicity and CLT for the Airy one process. Moverover, combined with the asymptotic behavior of the tail probability of the maximum of the Airy one process, we obtain a precise asymptotic for the maximum.

Limiting behaviors of supercritical Galton-Watson processes ——from finitely many types to countably many types

Jiangrui TAN 谭江睿（博三，导师：张梅) *Beijing Normal University*

Abstract: Large deviation rates and harmonic moments of single-type Galton-Watson processes, have attracted many attentions in the last 20 years. One of the most interesting phenomena is that there exists a phase transition associated with Schr?der constant in both the decay rates of large deviation probabilities and harmonic moments. In this talk, we show that the phase transition phenomenon remains valid in a multi-type setting. However, when extending to countably many types, many tools and strategies are not applicable. As an entry point, we investigate a special infinite-type GW process, in which individuals are allowed to produce more than one time. Some results and struggles are given as well.

长条形beta系综

Yutao MA 马宇韬 *Beijing Normal University*

Abstract: 此次报告中，我们将综述长条形beta系综的极限定理，包括beta系综之间的相互逼近、经验测度的大偏差、极值的大偏差与稀有事件的重要性采样等。

On some classical problems about upward uniformly finite range Markov jump processes

Yi ZHAO 赵奕（博三，导师：张余辉） *Beijing Normal University*

Abstract: For upward uniformly finite range Markov jump processes, also called m-birth processes, we mainly consider their recurrence and uniqueness, moments and the distribution of the first hitting time, where the approximation technique and minimal nonnegative solution theory play a crucial role.

Markov 链的起源与发展及其应用

Yong-Hua MAO毛永华 *Beijing Normal University*

Abstract: 回顾并梳理Markov 链自诞生到发展到成熟之历程，包括Markov 链的广泛应用，以及最新发展. 最后提出若干‘老大难’问题和几个新问题. (持续更新中）
