BOOK OF ABSTRACTS

The Second Workshop on
Branching Markov Processes and Related Topics

April 29–May 02, 2016

Wuhu, Anhui, China

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Markov Collision-Branching Processes with Immigration

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Abstract: In this talk, the regularity and ergodic properties of the Markov Branching Collision Process with Immigration (MBCIP) are addressed. Some easy checking conditions for the regularity of the Feller minimal MBCIP are firstly established. We provide some good conditions under which the Feller minimal MBCIP is positive recurrent and then the analytic form of the generating function of the stationary distribution is established. The extinction behavior of a closely linked absorbing MBCIP is also revealed. An example is provided to illustrate our results.

Asymptotic behaviors of the empirical measure process for a catalytic Fleming-Viot branching system

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Abstract: We consider asymptotic behaviors of the empirical measure process for a catalytic Fleming-Viot branching system. Some results on convergence rates and moderate deviations of the empirical measure process are presented.

Second-order expansion in the central limit theorem for a strongly nonlattice branching random walk

(Joint work with Prof. Quansheng Liu)

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Abstract: Consider a branching random walk on the real line, we give the second-order expansion in the central limit theorem for the counting measure of particles under the assumptions including a moment condition of the form $EX(\ln X)^{1+\lambda}$ for the offspring distribution, the Cramér condition on the characteristic function of the motion law and a finite moment condition for the motion law.

Reference

[1] Z.-Q. Gao, Q. Liu, First- and second-order expansions in the central limit theorem for a branching random walk, C. R. Acad. Sci. Paris, Ser. I (2016), http:// dx. doi. org/10.1016/ j.crma.2016.01.021.

[2] Z.-Q. Gao and Q. Liu, Exact convergence rate in the central limit theorem for a branching random walk with a random environment in time, Stochastic Processes and their Applications (2016)

[3] Z.-Q. Gao and Q. Liu. Second-order asymptotic expansion for the distribution of particles in a branching random walk with a random environment in time. *https://hal.archives-ouvertes.fr/hal-01244736*, 2015.

Critical multi-type Galton-Watson trees conditioned to be large

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Abstract: Under minimal condition, we prove the local convergence of a critical multi-type Galton-Watson tree conditioned on having a large total progeny by types towards a multi-type Kesten's tree. The minimal hypotheses are the existence of the mean matrix which is assumed to be primitive and an aperiodic condition on the offspring distribution. We obtain the result by generalizing Neveu's strong ratio limit theorem for aperiodic random walks on d-dimensional integer space.

Large deviations of the maximum likelihood estimators for Cox-Ingersoll-Ross process

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Abstract: Consider the following Cox-Ingersoll-Ross process (squared radial Ornstein-Uhlenbeck process):

$$dX_t = (a + bX_t)dt + 2\sqrt{X_t}dW_t,$$

where $X_0 = x > 0$, $a > 0$, $b \in \mathbb{R}$ and W is a standard Brownian motion. Under ergodic ($b > 0$ and $a \geq 2$) and nonergodic cases, we study large deviations of the maximum likelihood estimators for a and b. Moreover, the rate functions can be calculated explicitly.

Reference

[1] Bercu,B., Richou,A., Large deviations for the Ornstein-Uhlenbeck process with shift, *Advance in Applied Probability*, 2015,47:880-901.

[2] Chaumaray,M., Large deviations for the squared radial Ornstein-Uhlenbeck process, *arXiv:1407.4949 [math.PR]*,2014.

[3] Barczy,M., Doring,L., Li,Z.H., Pap,G., On parameter estimation for critical affine processes, *Electronic Journal of Statistics*, 2013,7:647-696.

[4] Zani,M., Large deviations for squared radial Ornstein-Uhlenbeck processes, *Stochastic Processes and their Applications*, 2002, 102, 25-42, 2002.

n-type Markov Branching Processes with Immigration

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Abstract: In this paper, we consider n-type Markov branching processes with immigration and resurrection. The uniqueness criteria are first established. Then, the explicit expression of extinction probability and the mean extinction time are successfully obtained in the absorption case by using a new method. The recurrence and ergodicity criteria are given if the state 0 is not absorptive. Finally, if the resurrection rates are same as the immigration rates, the branching property and decay property are discussed in detail, it is shown that the process is a superimposition of a n-type branching process and an immigration. The exact value of the decay parameter λ_Z is given for the irreducible class $\mathbf{Z}_+^n$. Moreover, the corresponding λ_Z -invariant measures/vectors and quasi-distributions are presented.

Weighted Moments for a Branching Process in a Random Environment

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Abstract: We consider a supercritical branching process (Z_n) in an independent and identically distributed random environment $\xi = (\xi_n)$. Let W be the limit of the natural martingale $W_n = Z_n/E_\xi Z_n (n \geq 0)$, where E_ξ denotes the conditional expectation given the environment ξ. Some necessary and sufficient conditions for the existence of weighted moments of W of the form $E_\xi W^\alpha l(W)$ are researched, where $\alpha > 1$, and l is a positive function slowly varying at ∞ . The same conclusions are also proved for the maximum variable $W^* = \sup_{n\geq 1} W_n$ instead of the limit variable W.

A kind of generalized Jiřina processes

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Abstract: In this talk, we will first review some known results on the continuous state branching processes with state-dependent branching laws and then introduce two new limiting theorems related to the speed of extinction.

Stochastic equations for branching processes

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Abstract: A continuous-state branching process is the mathematical model for the random evolution of a large population of small individuals. The most important feature of the process is the branching property, which has led to many deep results. The trajectory of the continuous-state branching process can be constructed as the strong solution to a stochastic integral equation driven by Gaussian and Poisson time-space noises. More general population models may involve nonlinear branching, immigration, competition, environment and so on.

In this talk, we present a number of stochastic integral equations in the theory of continuous-state branching processes. We also explain how those s-tochastic equations can be used in the study the structural properties of the models.

Convergence of the additive martingale of a stable branching random walk

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Abstract: We consider the boundary case in a one-dimensional α-stable branching random walk, and study the derivative martingale (D_n) and the additive martingale (W_n). We prove that $n^\alpha W_n$ converges in probability to a positive limit. The limit is identified as a constant multiple of the almost sure limit of the derivative martingale.

Stochastic heat equation with fractional Laplacian and fractional noise

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Abstract: In this paper we study a general class of fractional stochastic heat equation on $\mathbb{R}^d$ $(d \geq 1)$ with additive fractional noise. For the equation, the existence, uniqueness and Hölder regularity of the mild solution are studied. In addition, in the case of space dimension 1, we prove the existence of the density for this solution and we establish lower and upper Gaussian bounds for the density by using Malliavin calculus. This is based on a joint work with Ciprian A. Tudor.

Some limit theorems for CBI-processes

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Abstract: We prove some limit theorems for continuous time and state branching processes with immigration (CBI). The results in law are obtained by studying the Laplace exponent and the almost-sure ones by exploiting a martingale. As an application, we also consider the coupling for the CBI processes.

Stability for the solutions to impulsive stochastic differential equations driven by G-Brownian motion

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Abstract: In this talk, I briefly introduce the G-Brownian motion and the related stochastic calculus based on it. Moreover, I will introduce our works on stability for the solutions to impulsive stochastic differential equations driven by G-Brownian motion.

Path to survival for the critical branching processes in a random environment[1]

(Joint work with Prof. Dyakonova E.E.)

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Abstract: A critical branching process $\{Z_k, k = 0, 1, 2, ...\}$ in a random environment is considered. It is known that if the associated random walk of the branching process belongs to the domain of attraction of a stable law with parameter $\alpha \in (0, 2]$ then there exists a sequence $\left\{c_n^{-1}, n = 1, 2, ...\right\}$ such that the conditional law

$$\mathcal{L}\left(\left\{c_n^{-1} \log Z_{nt}, 0 \le t \le 1\right\} | Z_n > 0\right)$$

weakly converges, as $n \to \infty$ to the law of an $\alpha-$stable Levy process conditioned to stay nonnegative on the interval $t \in [0, 1]$. We complement this result by showing that if $n \gg p \to \infty$ then the conditional law

$$\mathcal{L}\left(\left\{c_p^{-1} \log Z_{pu}, 0 \le u < \infty\right\} | Z_n > 0\right)$$

weakly converges to the law of an $\alpha-$stable Levy process conditioned to stay nonnegative on the semi-axis $[0, \infty)$.

The proof of this statement is based on a limit theorem describing the distribution of the initial part of the trajectories of a driftless random walk conditioned to stay nonnegative.

MSC: Primary 60J80; secondary 60K37; 60G50; 60F17

Keywords: Branching process; Random environment; Random walk to stay positive; Levy process to stay positive; Change of measure; Functional limit theorem

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Asymptotics of Sample Entropy Production Rate for Stochastic Differential Equations

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Abstract: By using the dimension-free Harnack inequality and the integration by parts formula for the associated diffusion semigroup, we prove the central limit theorem, the moderate deviation principle, and the logarithmic iteration law for the sample entropy production rate of stochastic differential equations with Lipschitz continuous and dissipative drifts.

Range of $(1, 2)$ random walk in random environment

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Abstract: Consider $(1, 2)$ random walk in random environment $\{X_n\}_{n\geq 0}$. In each step, the walk jumps at most a distance 2 to the right or a distance 1 to the left. For the walk transient to the right, it is proved that almost surely

$$\lim_{x\to\infty} \frac{\#\{X_n:\ 0 \leq X_n \leq x,\ n \geq 0\}}{x} = \theta$$

for some $0 < \theta < 1$. The result shows that the range of the walk covers only a linear proportion of the lattice of the positive half line. For the nearest neighbor random walk in random or non-random environment, this phenomenon could not appear in any circumstance.

Reference

[1] Hong, W. M., Sun, H. Y., Renewal theorem for $(L, 1)$-random walk in random environment, Acta Math. Sci. Ser. B Engl. Ed., Vol. 33(6), pp 1736-1748, 2013

[2] Kesten, H., A renewal theorem for random walk in a random environment, Proc. Sympos. Pure Math., Vol. 31, pp 67-77, 1977

[3] Letchikov, A. V., A criterion for linear drift and the central limit theorem for one-dimensional random walks in a random environment, Russian Acad. Sci. Sb. Math., Vol. 79(1), pp 73-92, 1994

[4] Oseledec, V. I., Multiplicative ergodic theorem: characteristic Lyapunov exponents of dynamic systems, Trudy Moskovskogo Matemaricheskogo Obshchestva, Vol. 19, pp 179-210, 1968

[5] Sznitman, A. S., Zerner, M. A., Law of large number for random walk in random environment, Ann Probab., Vol. 27(1), pp 1851-1867, 1999

A distribution-function-valued SPDE and its applications

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Abstract: In the paper, we further study the stochastic partial differential equation first proposed by Xiong (2013). Under localized conditions on the coefficients we show that the solution is in fact distribution-function-valued and we establish the pathwise uniqueness of the solution. As applications we obtain the well-posedness of the martingale problems for two classes of measure-valued diffusions: interacting super-Brownian motions and interacting Fleming-Viot processes. Properties of the two superprocesses such as the existence of density fields and the extinction behaviors are also studied.

Bernoulli convolution, Lehmer conjecture and uniform growth of linear groups

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Abstract: In this talk, we describe the relationship among the famous Erdos problem on Bernoulli convolution, the famous Lehmer conjecture in algebraic number theory and the uniform growth of linear groups.

Three SPDEs from branching interacting particle systems

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Abstract: In this talk, we will present three nonlinear stochastic partial differential equations arising from the study of measure-valued processes in random environment: Stochastic log-Laplace equation, SPDE for density field, and SPDE for "distribution" process. Some techniques developped for these equations will be introduced.

Survival Probability of Continuous-state Branching Processes in Random Environment

(Joint work with Prof Zenghu Li)

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Abstract: We introduce a general continuous-state branching processes in random environment defined as the strong solution of a stochastic integral equation. The environment is determined by a Lévy process with no jump less than -1. For a special case with stable branching mechanism, the decay rate of its survival probability is determined by the long time asymptotic behavior of the expectation of some exponential functional of a Lévy process. We shall see that five regimes arise for the convergence rate. Both the exact convergence rate and the explicit limiting coefficients are given. The key of the results is the observation that the asymptotics only depends on the sample paths of the Lévy process with local infimum decreasing slowly.

Reference

[1] He, H., Li, Z. and Xu, W. (2016): Continuous-state Branching Processes in Lévy Random Environments. *arXiv*:1601.04808. 20 Jan., 2016.

[2] Li, Z. and Xu, W. (2016): Asymptotic Results for Exponential Functionals of Lévy Processes. *arXiv*:1601.02363. 11 Jan., 2016.

The large deviations principle for transient nearest neighbor random walk with asymptotic zero drift

(Joint work with Prof. Wenming HONG)

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Abstract: We consider a class of special “Lamperti’s problem” – transient nearest neighbor random walk with asymptotic zero drift. Voit (1992) has proved a law of large numbers for this random walk using the method of polynomial hypergroups. Based on the decomposition of hitting times, we give another kind of proof for the LLN and establish the large deviations principle for this walk.

Maximum likelihood estimator for discretely observed CIR model with small α-stable noises

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Abstract: The maximum likelihood estimation of the drift and diffusion coefficient parameters in the CIR type model driven by α-stable noises is studied when the dispersion parameter $\varepsilon \to 0$ and the discrete observation frequency $n \to \infty$ simultaneously.

Least squares estimator for Ornstein-Uhlenbeck processes driven by fractional Lévy processes from discrete observations

(Joint work with Prof. Guangjun SHEN)

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Abstract: In this paper, we consider the problem of parameter estimation for Ornstein-Uhlenbeck processes with small fractional Lévy noises, based on discrete observations at n regularly spaced time points $t_i = i/n$, $i = 1, ..., n$ on $[0, 1]$. Least squares method is used to obtain an estimator of the drift parameter. The consistency and the asymptotic distribution of the estimator have been established.

Impacts of suppressing guide on information spreading

(Joint work with Prof JH Xu, BJ Ma, and Y Wu)

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Abstract: It is a common phenomenon that guides are introduced into suppressing the information spreading procedure in modern society for certain purpose. In this talk, an agent based model is established for analyzing the impacts of suppressing guides on information spreading quantitatively. We find that the spreading threshold depends on the attractiveness of the information and the topology of the social networks without guide. Furthermore, one would expect that the existence of suppressing guides in spreading networks may result in lower overall network diffusion of the information. However, we find that the opposite is true: the inclusion of suppressing guiding nodes leads to effectively stimulation of the rumor spreading on considering the reversal mind. These results can provide valuable theoretical references to public opinion guidance on rumor or news spreading.

Reference

[1] Larremore D, Shew WL, Ott E, Sorrentino F, and Restrepo JG (2014) Inhibition Causes Ceaseless Dynamics in Networks of Excitable Nodes, Physical Review Letters 112: 138103.

[2] Restrepo JG, Ott E, and Hunt BR (2007) Approximating the largest eigenvalue of network adjacency matrices. Physical Review E 76: 056119.

[3] Centola D (2010) The spread of behavior in an online social network experiment, Science 329: 1194.

Tail of stationary distribution of random walk on a strip with Lamperti drifts

(Joint work with Prof. Wenming Hong)

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Abstract: Consider random walk on a strip $Z^+ \times S$ with Lamperti drifts on Z^+-part, where the random walk on Z^+-part is near-neighbor. We study tail behavior of stationary distribution when the transition probabilities of random walk have asymptotic perturbations. The talk is divided into two parts, the case of transition probabilities tending to “positive recurrence domain”, and the case of transition probabilities tending to “zero recurrence domain”. By the tool of intrinsic branching structure buried in the random walk on a strip, we get the explicit expression of the stationary distribution. Together with the estimation of optimal matching distance, and asymptotic theory of the solution of linear difference system with disturbance respectively, we get the tail behavior of stationary distribution.

Reference

[1] Durrett, R. (2004). Probability: Theory and Examples. 3rd Edition. Duxbury.

[2] Bolthausen, E., Goldsheid, I. (2000). Recurrence and transience of random walks in random environments on a strip. Commun. Math. Phys., 214: 429-447.

[3] Krause G M. (1994). Bounds for the variation of matrix eigenvalues and polynomial roots. Linear Algebra Appl., 208: 73-82.

[4] Benzaid,Z., Lutz,D.A. (1987). Asymptotic representation of solutions of perturbed systems of linear difference equations. Stud.Appl.Math., 77: 195-221.

Some properties of super-Brownian motion in random environments

(Joint work with Prof Zhen-Qing Chen and Yanxia Ren)

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Abstract: We consider a superprocess $X = \{X_t, t \geq 0\}$ in a random environment described by a Gaussian field $\{W(t, x), t \geq 0, x \in \mathbb{R}^d\}$ whose covariance function is given by $g(x, y)(t \wedge s)$. Suppose there exits a positive function $\bar{g}$ such that $g(x, y) \leq \bar{g}(x - y)$ and the process X starts from m, the Lebesgue measure on $\mathbb{R}^d$. We first prove that for dimension $d \geq 3$ there exists $\delta > 0$ such that if $\sup_x \int_{\mathbb{R}^d} G(x, y)\bar{g}(y)dy \leq \delta$ then the distribution of X_t converges weakly to a non-trivial distribution π^m as $t \to \infty$ and $\int \mu\pi^m(d\mu) = m$. Moreover π^m is an invariant probability distribution of X_t. This result implies the **Conjecture 1.4** in [5] is true. We also show if $g(x, y) = g(x - y)$ with $g \in C^2(\mathbb{R}^d)$ and $g(0)$ being large enough, then X suffers local extinction.

Reference

[1] M. Cranston and T.S. Mountford (2006). Lyapunov exponent for the parabolic anderson model in $\mathbb{R}^d$. *J. Funct. Anal.*, **236**, 78-119.

[2] G. Da Prato and J. Zabczyk (2014). *Stochastic equations in infinite dimensions*, volume 152. Cambridge university press, .

[3] D. A. Dawson and H. Salehi (1980). Spatially homogeneous random evolutions. *J. Multivariate Anal.* **10(2)**, 141-180.

[4] L. Mytnik (1996). Superprocesses in random environments. *Ann. Probab.* **24(1)**, 1953-1978.

[5] L. Mytnik and J. Xiong (2007). Local extinction for superprocesses in random environments. *Elec. J. Probab.* **12**, 1349-1378.

[6] R. G. Pinsky (2001). Invariant probability distributions for measure-valued diffusions. *Ann. Probab.* **29(4)**, 1476-1514.

A CMJ branching process coded by spectrally positive Levy process

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Abstract: It was pointed out by Lambert (2010) that a binary Crump-Mode-Jagers (CMJ) branching process with constant branching rate and i.i.d. life spans can be coded by a spectrally positive Levy process of bounded variation. This observation allows us to study the CMJ process via the fluctuation theory for Levy processes. In this talk we will present a few results along this line.

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