

Birth and death process with bounded jumps in random environment

Hua-Ming WANG *Department of Mathematics, Anhui Normal University, Wuhu 241003, China* E-mail: hmking@mail.ahnu.edu.cn

Abstract: In this talk, we give an introduction of Birth and Death Process (BDP for short) with bounded jumps in random environment based on our recent works [3, 4, 5] enumerated below. Firstly, we study BDP with one-side bounded jumps on positive half lattice in fixed environment. Criteria for recurrence and positive recurrence are presented at first. For the positively recurrent case, based on the branching structure for (L,1) random walk constructed in [1], we formulate the explicit form of the stationary distribution of the process. Secondly, we study BDP with bounded jumps in random environment, say $\{N_t\}_{t \geq 0}$. Sufficient conditions for the existence and criteria for the recurrence of the process are given at first. Then by an argument known as “the environment viewed from particle”, we derive the Law of Large Numbers (LLN for short) for the h -skeleton process $\{N_{nh}\}_{n \geq 0}$, which is indeed a discrete time random walk with unbounded jumps in random environment. The LLN for $\{N_t\}_{t \geq 0}$ is also proved by using the LLN of $\{N_{nh}\}_{n \geq 0}$. We mention that, by taking advantage of the branching structure for random walk with bounded jumps constructed in [2], the asymptotic velocity of the LLN for $\{N_t\}_{t \geq 0}$ is given explicitly.

References

- [1] Hong, W. M. and Wang, H. M., Intrinsic branching structure within (L-1) random walk in random environment and its applications, *Infin. Dimens. Anal. Quantum Probab. Relat. Top.*, Vol. 16, 1350006 [14 pages], 2013
- [2] Hong W. M., and Wang H. M., Intrinsic branching structure within random walk on \mathbb{Z} , *Teor. Veroyatnost. i Primenen.*, Vol. 58(4), 730-751, 2013; English version will appear in *Theory of Probability and Its Applications*, 2014
- [3] Wang, H. M., Birth and death process with one-side bounded jumps in random environment, arXiv:1407.3385, 2014
- [4] Wang, H. M., Birth and death process with bounded jumps in random environment, arXiv:1406.6222, 2014
- [5] Wang, H. M., Stationary distribution for birth and death process with one-side bounded jumps, arXiv:1407.4007, 2014