北京师范大学 随机数学研究中心

学术报告

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题目: Conditioned local limit theorems for random walks on the real line

时间: 2022 年 5 月 18 日 (周三) 下午 4:00-5:00

地点: 腾讯会议 539-115-956

摘要: Consider a random walk $S_n = \sum_{i=1}^{n} X_i$ with independent and identically distributed real-valued increments X_i of zero mean and finite variance. Assume that X_i is non-lattice and has a moment of order $2+\delta$. For any $x \geq 0$, let $\tau_x = \inf \{k \geq 1 : x + S_k < 0\}$ be the first time when the random walk $x + S_n$ leaves the half-line $[0, \infty)$. We study the asymptotic behavior of the probability $\mathbb{P}(\tau_x > n)$ and that of the expectation $\mathbb{E}\left(f(x + S_n - y), \tau_x > n\right)$ for a large class of target function f and various values of x, y possibly depending on n. This general setting implies limit theorems for the joint distribution $\mathbb{P}\left(x + S_n \in y + [0, \Delta], \tau_x > n\right)$ where $\Delta > 0$ may also depend on n. In particular, the case of moderate deviations $y = \sigma\sqrt{qn\log n}$ is considered. We also deduce some new asymptotics for random walks with drift and give explicit constants in the asymptotic of the probability $\mathbb{P}(\tau_x = n)$. For the proofs we establish new conditioned integral limit theorems with precise error terms. Joint work with I. Grama.