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Precise rates in the law of iterated logarithm for the moment of I.I.D. random variables

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摘要

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Precise rates in the law of iterated logarithm for the moment of I.I.D. random variables

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Abstract Let $\{X, X_n; n\ge 1\}$ be a sequence of i.i.d. random variables, ${\rm E} X=0$, ${\rm E} X^2=\sigma^2<\infty$. Set $S_n=X_1+X_2+\cdots+X_n$, $M_n=\max_{k\le n}|S_k|$, $n\ge 1$. Let $a_n=O(1/\log\log n)$. In this paper, we prove that, for $b>-1$, $$\align &\lim_{\varepsilon\searrow 0}\varepsilon^{2(b+1)} \sum_{n=1}^{\infty}\frac{(\log\log n)^{b}}{ n\log n }n^{-1/2}{\rm E}\{M_n-\sigma(\varepsilon+a_n) \sqrt{2 n\log\log n}\}_{+} \non & \qquad =\frac{\sigma 2^{-b}}{(b+1)(2b+3)}{\rm E}|N|^{2b+3}\sum_{k=0}^{\infty} \frac{(-1)^k}{(2k+1)^{2b+3}} \endalign $$ holds if and only if ${\rm E} X=0$ and ${\rm E} X^2=\sigma^2<\infty$.

Key words the law of iterated logarithm strong approximation truncation method i.i.d. random variables

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