SMALL DEVIATIONS OF SERIES OF INDEPENDENT POSITIVE RANDOM VARIABLES WITH WEIGHTS CLOSE TO EXPONENTIAL

A. A. Borovkov and P. S. Ruzankin

Let $\xi, \xi_0, \xi_1, \ldots$ be independent identically distributed (i.i.d.) positive random variables. The present paper is a continuation of the article [1] in which the asymptotics of probabilities of small deviations of series $S = \sum_{j=0}^{\infty} a(j)\xi_j$ was studied under different assumptions on the rate of decrease of the probability $\mathbb{P}(\xi < x)$ as $x \to 0$, as well as of the coefficients $a(j) \geq 0$ as $j \to \infty$. We study the asymptotics of $\mathbb{P}(S < x)$ as $x \to 0$ under the condition that the coefficients $a(j)$ are close to exponential. In the case when the coefficients $a(j)$ are exponential and $\mathbb{P}(\xi < x) \sim bx^{\alpha}$ as $x \to 0$, $b > 0$, $\alpha > 0$, the asymptotics $\mathbb{P}(S < x)$ is obtained *in an explicit form* up to the factor $x^{o(1)}$. Originality of the approach of the present paper consists in employing the theory of delayed differential equations. This approach differs significantly from that in [1].

Key words and phrases: small deviations, series of independent random variables, delayed differential equations.

Borovkov Aleksandr Alekseevich
Ruzankin Pavel Sergeevich
    Sobolev Institute of Mathematics,
    Novosibirsk State University,
    Novosibirsk, 630090, Russia.
    E-mail: borovkov@math.nsc.ru,
    E-mail: ruzankin@math.nsc.ru

1. *Borovkov A. A. and Ruzankin P. S.* (2008) On small deviations of series of weighted random variables, *J. Theoret. Probab.* v. 21, N 3, 628–649.