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Upper estimate of overrunning by $\text{Sub}_\varphi(\Omega)$ random process the level specified by continuous function. (English) [Zbl 1118.60025](#)

Random Oper. Stoch. Equ. 13, No. 2, 111-128 (2005).

The authors deal with φ -sub-Gaussian stochastic processes from the space $\text{Sub}_\varphi(\Omega)$ defined on a compact set as well as strictly stochastic processes from the space $\text{SSub}_\varphi(\Omega)$. These classes of stochastic processes are more general than the class of Gaussian processes and they have many applications in queueing theory and financial mathematics. For properties of random variables and processes from the spaces $\text{Sub}_\varphi(\Omega)$ and $\text{SSub}_\varphi(\Omega)$ see the book by V. V. Buldygin and Yu. V. Kozachenko ["Metric characterization of random variables and random processes" (1998; [Zbl 0933.60031](#))]. Estimates for the probability that the supremum of a φ -sub-Gaussian stochastic process overruns a level specified by a continuous function are proposed. The obtained estimates are applied to a queueing system determined by the Ornstein-Uhlenbeck process from the space $\text{SSub}_\varphi(\Omega)$ with $\varphi(u) = \begin{cases} |u|^r, & |u| > 1, \\ |u|^2, & |u| \leq 1, \end{cases} r \geq 2$. It is shown that for the interval $[a, b]$ there exist constants A, B, D such that

$$P \left\{ \sup_{t \in [a, b]} X(t) > r \right\} \leq \exp \left\{ -\frac{(x + D)^{r/(r-1)}}{B} \right\}$$

for large enough buffer capacity x .

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MSC:

[60G07](#) General theory of stochastic processes
[60K25](#) Queueing theory (aspects of probability theory)

Cited in **1** Review
Cited in **9** Documents

Keywords:

φ -sub-Gaussian stochastic process; metric entropy; supremum distribution; Ornstein-Uhlenbeck process