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ON LIMIT THEOREMS FOR THE FIRST EXIT TIME FROM A STRIP FOR STOCHASTIC PROCESSES. II

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We consider a stochastic process $\xi(t)$, $t \geq 0$, $\xi(0) = 0$, with independent stationary increments. Let $\eta(t, a)$ be a stochastic process with delay at the boundary of the half-interval $[-a, \infty)$, $a \geq 0$, i.e., $\eta(t, a) = \xi(t) - a - \min\{-a;\ \inf_{s \leq t} \xi(s)\}$. Under some restrictions on $\xi(1)$, we obtain asymptotic expansions for the Laplace–Stieltjes transforms of the normed random variable $\theta(a, b) = \inf\{t : \eta(t, a) \geq b\}$ as $b \to \infty$. The cases $\mathbb{E}\,\xi(1) = 0$ and $\mathbb{E}\,\xi(1) < 0$ are considered and the situations $a = \text{const}$, $b \to \infty$; $a \to \infty$, $b \to \infty$; and $a \to \infty$, $b = \text{const}$ are treated separately.

Key words and phrases: first exit time, boundary crossing problems for stochastic processes, asymptotic expansion, infinitely divisible factorization.

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