

Carmona, Philippe; Petit, Frédérique; Yor, Marc

On the distribution and asymptotic results for exponential functionals of Lévy processes.

(English) [Zbl 0905.60056](#)

Yor, Marc (ed.), Exponential functionals and principal values related to Brownian motion. A collection of research papers. Madrid: Univ. Autónoma de Madrid, Departamento de Matemáticas. Biblioteca de la Revista Matemática Iberoamericana. 73-126 (1997).

Summary: The aim of this paper is to study the distribution and the asymptotic behavior of the exponential functional $A_t := \int_0^t e^{\xi_s} ds$, where $(\xi_s, s \geq 0)$ denotes a Lévy process. When $A_\infty < \infty$, we show that in most cases, the law of A_∞ is a solution of an integro-differential equation; moreover, this law is characterized by its integral moments. When the process ξ is asymptotically α -stable, we prove that $t^{-1/\alpha} \log A_t$ converges in law, as $t \rightarrow \infty$, to the supremum of an α -stable Lévy process; in particular, if $\mathbb{E}[\xi_1] > 0$, then $\alpha = 1$ and $(1/t) \log A_t$ converges almost surely to $\mathbb{E}[\xi_1]$. Eventually, we use Girsanov's transform to give the explicit behavior of $\mathbb{E}[(a + A_t(\xi))^{-1}]$ as $t \rightarrow \infty$, where a is a constant, and deduce from this the rate of decay of the tail of the distribution of the maximum of a diffusion process in a random Lévy environment.

For the entire collection see [\[Zbl 0889.00015\]](#).

MSC:

60J60 Diffusion processes

60J99 Markov processes

Cited in **5** Reviews
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Keywords:

generalized Ornstein Uhlenbeck processes; Brownian motion; integro-differential equation; integral moments; diffusion process