Abstract

This paper deals with the large deviations behavior of a stochastic process called thinned Lévy process. This process appeared recently as a stochastic-process limit in the context of critical inhomogeneous random graphs \cite{critical}. The process has a strong negative drift, while we are interested in the rare event of the process being positive at large times. To characterize this rare event, we identify a tilted measure. This presents some challenges inherent to the power-law nature of the thinned Lévy process. General principles prescribe that the tilt should follow from a variational problem, but in the case of the thinned Lévy process this involves a Riemann sum that is hard to control. We choose to approximate the Riemann sum by its limiting integral, derive the first-order correction term, and prove that the tilt that follows from the corresponding approximate variational problem is sufficient to establish the large deviations results.

Key words: thinned Lévy processes, large deviations, exponential tilting, critical random graphs.
MSC2000 subject classification. 60C05, 05C80, 90B15.