

**Zhou, Xiaowen****Exit problems for spectrally negative Lévy processes reflected at either the supremum or the infimum.** (English) [Zbl 1132.60042](#)

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Summary: For a spectrally negative Lévy process  $X$  on the real line, let  $S$  denote its supremum process and let  $I$  denote its infimum process. For  $a > 0$ , let  $\tau(a)$  and  $\kappa(a)$  denote the times when the reflected processes  $\hat{Y} := S - X$  and  $Y := X - I$  first exit level  $a$ , respectively; let  $\tau_-(a)$  and  $\kappa_-(a)$  denote the times when  $X$  first reaches  $S_{\tau(a)}$  and  $I_{\kappa(a)}$ , respectively. The main results of this paper concern the distributions of  $(\tau(a), S_{\tau(a)}, \tau_-(a), \hat{Y}_{\tau(a)})$  and of  $(\kappa(a), I_{\kappa(a)}, \kappa_-(a))$ . They generalize some recent results on spectrally negative Lévy processes. Our approach relies on results concerning the solution to the two-sided exit problem for  $X$ . Such an approach is also adapted to study the excursions for the reflected processes. More explicit expressions are obtained when  $X$  is either a Brownian motion with drift or a completely asymmetric stable process.

**MSC:****60G51** Processes with independent increments; Lévy processes**60B15** Probability measures on groups or semigroups, Fourier transforms, factorizationCited in **14** Documents**Keywords:**

spectrally negative Lévy process; reflected Lévy process; fluctuation theory; exit problem; excursion; risk model; ruin time

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