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| Sommario/riassunto | Exit problems for one-dimensional Levy processes are easier when jumps only occur in one direction. In the last few years, this intuition became more precise: we know now that a wide variety of identities for exit problems of spectrally-negative Levy processes may be ergonomically expressed in terms of two q-harmonic functions (or scale functions or positive martingales) W and Z. The proofs typically require not much more than the strong Markov property, which hold, in principle, for the wider class of spectrally-negative strong Markov processes. This has been established already in particular cases, such as random walks, Markov additive processes, Levy processes with omega-state-dependent killing, and certain Levy processes with state dependent drift, and seems to be true for general strong Markov processes, subject to technical conditions. However, computing the functions W and Z is still an open problem outside the Levy and diffusion classes, even for the simplest risk models with state-dependent parameters (say, Ornstein-Uhlenbeck or Feller branching diffusion with phase-type jumps). |