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                        and Related Topics

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   Sommario/riassunto   Exit problems for one-dimensional Lévy 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 Lévy 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, Lévy processes with
                        omega-state-dependent killing, and certain Lévy 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 Lévy and
                        diffusion classes, even for the simplest risk models with state-
                        dependent parameters (say, Ornstein–Uhlenbeck or Feller branching
                        diffusion with phase-type jumps).