

# One dimensional completely asymmetric Markov processes

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## Abstract

In the early 50's, Feller characterized fully the analytical structure of one dimensional diffusion processes. In particular, he constructed their Green functions in terms of the two positive fundamental solutions of a second order differential equations. He also characterized completely the Laplace transform of their first exit times from an interval in terms of these two fundamental solutions. In this work, we aim to pursue Feller's program for the class of one dimensional completely asymmetric Markov processes, that is strong Markov processes having jumps only in one direction. We will present an original methodology based mostly on potential theoretical arguments to characterize the Laplace of their first exit times from an interval which may occur by a jump. We will also describe their resolvent densities whose existence of a nice version is provided. We illustrate our approach by recovering easily the well-known fluctuations identities for spectrally negative Lévy processes.