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Some functionals for solvable diffusion processes with applications to financial modelling and option pricing

We discuss the derivation of closed-form formulae for the distribution and expected value of some functionals of new dual families of solvable diffusion processes that arise from Doob space-time transformations. In particular, we obtain analytical formulae for various transition densities, first-hitting time distributions, joint distributions of extrema, as well as the distribution and expected values of functionals of occupation times of the solvable diffusion processes. We present some numerical applications of the models to the risk-neutral pricing of barrier, lookback and occupation-time options. We conclude with a discussion of future extensions and applications.