Probabilistic representation of integration by parts formulae for some stochastic volatility models with unbounded drift

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Résumé

In this paper, we establish a probabilistic representation as well as some integration by parts formulae for the marginal law at a given time maturity of some stochastic volatility model with unbounded drift. Relying on a perturbation technique for Markov semigroups, our formulae are based on a simple Markov chain evolving on a random time grid for which we develop a tailor-made Malliavin calculus. Among other applications, an unbiased Monte Carlo path simulation method stems from our formulas so that it can be used in order to numerically compute with optimal complexity option prices as well as their sensitivities with respect to the initial values or Greeks in finance, namely the *Delta* and *Vega*, for a large class of non-smooth European payoff. Numerical results are proposed to illustrate the efficiency of the method. This work joint with Noufel Frikha, Houzhi Li.

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