A Symmetrized Milstein scheme with strong rate of convergence for some CEV-like SDEs

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Abstract

We consider the approximation problem of SDE with non-Lipschitz diffusion coefficients. More specifically, we consider diffusion coefficients of the typical form —x—ˆa, used in popular volatility models in finance such as CEV models. In the context of a one dimensional SDE, we present a modified explicit Milstein scheme that allows us to prove strong convergence at rate one under some theoretical restrictions on the drift and diffusion parameters. The proof lies on classical arguments, except for the treatment of the local error that relies on a priori analysis of a weighted local error. If the theoretical rate one is optimal, as for others approximation strategies the theoretical restrictions imposed in the proof are often pessimistic as shown by some comparative numerical experiments.

This is a joint work with Hector Olivero (Universidad de Chile)

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