Customized tamed numerical schemes for SDEs and BSDEs

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Abstract

In this talk we introduce a family of numerical approximations for the stochastic differential equations (SDEs) with, possibly, no-globally Lipschitz coefficients. We show that for a given Lyapunov function $V : \mathbb{R}^d \to [1, \infty)$ we can construct a suitably tamed Euler scheme that preserves so called V-stability property of the original SDEs without imposing any restrictions on the time discretisation step. V-stability condition plays a crucial role in numerous stability and integrability results for SDEs developed by Khasminski [1]. These results have important consequences for MLMC simulations where it is important that the numerical scheme preserves qualitative properties of the solutions to the SDEs for all range of time-steps. We will further show that developed methodology naturally extends to the time-discretizations of backward SDEs (BSDEs).

References

[1] R.Z. Khasminski. *Stochastic Stability of Differential Equations*. Kluwer Academic Pub, 1980.

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