Xiaoyue Li (Northeast Normal University, China)

Explicit Numerical Approximations for Stochastic Differential Equations in Finite and Infinite Horizons: Truncation Methods, Convergence in pth Moment, and Stability

Abstract

Solving stochastic differential equations (SDEs) numerically, explicit Euler–Maruyama (EM) schemes are used most frequently under global Lipschitz conditions for both drift and diffusion coefficients. In contrast, without imposing the global Lipschitz conditions, implicit schemes are often used for SDEs but require additional computational effort; along another line, tamed EM schemes and truncated EM schemes have been developed recently. Taking advantages of being explicit and easily implementable, truncated EM schemes are proposed in this work. Convergence of the numerical algorithms is studied, and pth moment boundedness is obtained. Furthermore, asymptotic properties of the numerical solutions such as the exponential stability in pth moment and stability in distribution are examined. Several examples are given to illustrate our findings.