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Exponential stability of the semi-tamed Euler scheme for the stochastic age-dependent population system with Markov switching. (Chinese. English summary) Zbl 1363.65007

Summary: The semi-tamed Euler scheme for the stochastic age-dependent population system with Markovian switching is discussed. Under the non-local Lipschitz condition, by using Burkholder-Davis-Gundy inequality, Ito formula and Gronwall lemma, it is shown that the semi-tamed Euler method converges strongly with the standard order one-half to the exact solution. The authors also reveal that the scheme does have an advantage in reproducing the mean square stability of the exact solution with fixed stepsizes. A numerical example is provided to illustrate the theoretical results.

MSC:
65C30 Numerical solutions to stochastic differential and integral equations
60H15 Stochastic partial differential equations (aspects of stochastic analysis)
60H35 Computational methods for stochastic equations (aspects of stochastic analysis)
92D25 Population dynamics (general)
65C40 Numerical analysis or methods applied to Markov chains
65L20 Stability and convergence of numerical methods for ordinary differential equations

Keywords:
stochastic age-dependent population system; mean square stability; semi-tamed Euler scheme; non-local Lipschitz condition; Markov chain; convergence; numerical example

Full Text: DOI