

3:00-3:35 Giorgos Vasdekis (School of Mathematics, Statistics and Physics, Newcastle University, UK)

Skew-symmetric schemes for robust SDE sampling

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We propose a new simple and explicit numerical scheme for time-homogeneous stochastic differential equations (SDEs), focusing on the case where the drift does not satisfy the Lipschitz property. The scheme is based on sampling increments at each time step from a skew-symmetric probability distribution, with the level of skewness determined by the drift and volatility of the underlying process. We show that as the step-size decreases the scheme converges weakly to the SDE of interest. We then consider the problem of simulating from the limiting distribution of an ergodic SDE using the numerical scheme with a fixed step-size. We establish conditions under which the numerical scheme converges to equilibrium at a geometric rate, and quantify the bias between the equilibrium distributions of the scheme and of the true diffusion process. Time permitting, we will also discuss some recent results on stronger forms of convergence and on Multi-Level Monte Carlo extensions. Our results are supported via numerical simulations, which indicate that the schemes possess a robustness property with respect to different step-sizes. This is joint work with Y. Iguchi, S. Livingstone, N. Nusken and R. Zhang.