

Title:

Bayesian Inference for Stochastic Differential Equations

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Abstract:

With stochastic differential equations (SDEs), one can realistically model the time-continuous evolution of natural phenomena in life sciences. Statistical inference for SDEs, however, is challenging in practice as the likelihood function is typically intractable. This talk explains and further develops a well-known Bayesian approach which introduces auxiliary observations by means of Markov chain Monte Carlo (MCMC) techniques. This procedure originally suffers from convergence problems which stem from a deterministic link between the model parameters and the quadratic variation of a continuously observed sample path. This talk shows a neat modification of the above approach for general multi-dimensional SDEs and proves that the so-constructed MCMC scheme converges. The potential of the estimation method is demonstrated using the example of single-cell protein dynamics.