Markov processes and corresponding PDEs: from a phenomenon to the pure mathematics and back

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Abstract:
We consider the time continuous Markov stochastic processes and recall its origin in natural phenomena. We discuss stochastic integrals and their dependency on the discretization choice and compare the Ito and the Stratonovich calculus. We then discuss PDEs appearing in the context of stochastic processes and show its application to modern finance and natural sciences.

Keywords: Brownian Motion, Markov, Stochastic Processes, Kolmogorov- Chapman Equation, Ito, Stratonovich, Kolmogorov-Forward Equation, Fokker-Planck