
A stochastic parametrix method

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Abstract

We represent the semigroup of a diffusion process as the expectation of a random variable which is constructed following the ideas of the parametrix method: this is a development in infinite series of multiple integrals. This idea is combined with a second one which allows us to compute the infinite series using a sample of a Poisson process. The original motivation of such a procedure is to prove regularity for diffusion processes with Hölder continuous coefficients. But this integral representation may be also considered as the starting point of a Monte Carlo procedure. The drawback is that the random variable at hand has infinite variance, and so a direct application is not possible. One has to imagine some complementary truncation procedure in order to get finite variance - and of course this would introduce some bias.

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