# Numerical approximation of random and stochastic (partial) differential equations

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Higher order numerical schemes for stochastic differential equations (SODEs) can be derived systematically using stochastic Taylor expansions based on iterated applications of the Itô formula. For stochastic partial differential equations (SPDEs) there is no general Itô formula that can be used in this way. Nevertheless higher order temporal expansions for mild solutions of SPDEs are possible using Taylor-like expansions with an idea that was first used for pathwise random ordinary differential equations (RODEs). This will be illustrated first for RODEs and then extended to SPDEs. The same relationship between RODEs and SODES as well as RPDEs and SPDEs will be indicated as well as other issues that arise in their discretization.

**References**

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