

*A new approach to construct higher weak order stochastic  
Runge-Kutta methods*

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The difficulty of the creation of weak high order integrators for stochastic dynamics lies in the tedious calculations of order conditions. The original approaches focused on adapting strong approximations, mainly replacing the iterated stochastic integrals by random variables that have the same moments. The methods obtained this way are sub-optimal in their number of function evaluations.

In this talk, using a specific set of random Runge-Kutta coefficients, we greatly reduce the number of order conditions for weak second order integration of stochastic dynamics. The approach is successfully applied to the creation of a collection of new simple stochastic Runge-Kutta methods of weak order two with an optimal number of stages.

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