Runge-Kutta methods for stochastic Hamiltonian problems with additive noise

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In this talk, we extend the ideas of Brugnano, Iavernaro and Trigiante in their development of HBVM(s,r) methods for deterministic Hamiltonian problems to the case of nonlinear, additive noise, stochastic Hamiltonian problems. In particular, by simulating independent Wiener process at each stage of a Runge-Kutta method (rather than just simulating a single Weiner process per step) we can better match the moments of the underlying stochastic problem. We present numerical results demonstrating this improvement, using the modified midpoint rule with two Wiener processes per step.