Optimal simulation schemes for Lévy driven stochastic differential equations

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We consider a general class of high order weak approximation schemes for stochastic differential equations driven by L\'evy processes with infinite activity. These schemes combine a compound Poisson approximation for the jump part of the L\'evy process with a high order scheme for the Brownian driven component, applied between the jump times. The overall approximation is analyzed using a stochastic splitting argument. The resulting error bound involves separate contributions of the compound Poisson approximation and of the discretization scheme for the Brownian part, and allows, on one hand, to balance the two contributions in order to minimize the computational time, and on the other hand, to study the optimal design of the approximating compound Poisson process. For driving processes whose L\'evy measure explodes near zero in a regularly varying way, this procedure allows to construct discretization schemes with arbitrary order of convergence.

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