

Implicit Runge-Kutta methods based on splitting for stiff stochastic differential equations

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In this talk we will discuss implicit Runge-Kutta methods based on splitting for solving stiff Stratonovich stochastic differential equations. Two splitting techniques are used. These are the balanced splitting technique and the deterministic splitting technique. We first present a two-stage implicit Runge-Kutta method based on splitting with strong order 1.0 which is corrected once and the update is computed at the end of each step. In order to improve stability properties of the implicit methods based on splitting, we present a family of implicit methods which are the so-called stiffly accurate stochastic Runge-Kutta methods. Two implicit methods will be presented which are based on stiffly accurate Runge-Kutta methods and splitting techniques with strong order 1.0. These two methods are corrected twice and no update is needed. The stability properties and numerical results of these two methods show that implicit methods which are based on stiffly accurate Runge-Kutta methods and splitting techniques are suitable for solving stiff SDEs.