

Abstract

Mohamed A Omar

The composite Milstein methods for the numerical solution of Stratonovich stochastic differential equations

In this paper, we present two composite Milstein methods for the strong solution of Stratonovich stochastic differential equations driven by d -dimensional Wiener processes. The composite Milstein methods are a combination of semi-implicit and implicit Milstein methods. The criterion for choosing either the implicit or the semi-implicit method at each step of the numerical solution is given. The stability and convergence properties of the proposed methods are analyzed for the linear test equation. It is shown that the proposed methods converge to the exact solution in Stratonovich sense. In addition, the stability properties of our methods are found to be superior to those of the Milstein and the composite Euler methods. The convergence properties for the nonlinear case are shown numerically to be the same as the linear case. Hence, the proposed methods are a good candidate for the solution of stiff SDEs.