

Numerical solution of stochastic differential equations, using explicit EULER-MARUYAMA method

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Abstract

This paper presented the solution of general first order stochastic differential equations (SDEs) using Explicit Euler-Maruyama method (EEMM). The implementation of the method was achieved by solving two SDEs of first order. These are drift function free Black-Scholes option price model (BSOPM) used in financial settings and non-linear Itô stochastic differential equation (NLISDE) with multiplicative noise. The mean absolute errors (MAE) were calculated using absolute errors obtained from the exact solution and numerical solution of the given problems. The performance of the method was compared using the mean absolute error. The effect of changing the stepsize of the method was examined. The accuracy of the method was also examined by determining the strong order of convergence of the method. The sample graphical solutions of the method applied to each problem were displayed for two stepsizes.

Keywords: Stochastic Differential Equations, Drift-function free Black Scholes Option Price Model, Explicit Euler-Maruyama Method, Mean Absolute error, Strong Order of Convergence.

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