Abstract

This thesis is concerned with the design and analysis of numerical methods for linear stochastic delay differential and integrodifferential equations. Stochastic differential equations often result in many stochastic modeling of problems in such areas as population dynamics, financial modeling and sea wave analysis etc. But the explicit solution of the many stochastic differential equations cannot be obtained. This thesis analyses new and efficient numerical methods and carried-out study of their stability properties for linear stochastic delay differential and integrodifferential equations. The first problem this thesis deals with the study of mean-square stability of second-order Runge-Kutta methods for multi-dimensional linear stochastic differential equations. The second problem is the mean-square stability of semi-implicit Euler method for linear stochastic differential equations with multiple delays and Markovian switching. The third problem is the mean-square stability of Milstein method for linear stochastic delay integrodifferential equations with Markovian switching. The fourth and fifth problems deal with the study of convergence and mean-square stability split-step methods for linear stochastic delay integrodifferential equations. The last problem is T-stability of split-step methods linear stochastic delay integrodifferential equations.