Asymptotical mean-square stability of linear ϑ-methods for stochastic pantograph differential equations: variable stepsize and transformation approach

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Abstract

The paper deals with the asymptotical mean-square stability of the linear ϑ-methods under variable stepsize and transformation approach for stochastic pantograph differential equations. A limiting equation for the analysis of numerical stability is introduced by Kronecker products. Under the condition which guarantee the stability of exact solutions, the optimal stability region of the linear ϑ-methods under variable stepsize is given by using the limiting equation, i.e., ϑ [?] (1/ 2,1], which is the same to the deterministic problems. Moreover the linear ϑ-methods under the transformation approach are also considered and the result of the stability is improved for ϑ = 1 /2. Finally, numerical examples are given to illustrate the asymptotical meansquare stability under variable stepsize and transformation approach.

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