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Numerical Computation of Third Order Delay Differential Equations by Using Direct Multistep Method

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Abstract

This paper introduces a direct multistep method to solve third order delay differential equations (DDEs) based on the boundary conditions given. The multistep method is presented in direct integration approach to reduce the total function calls involved and the method is derived implicitly so that the accuracy is attained. The method is also in block for every iteration to reduce total steps taken. The DDEs involve the endpoints of boundary conditions, hence, the shooting technique is to choose for the best value of additional initial value. The constant and pantograph delay types are the DDEs problems considered in this study. Lagrange interpolation is used to interpolate the delay involved in pantograph problems. The observation of the multistep method in terms of order, consistency, and convergence is also presented in this paper. The numerical results obtained are compared with the previous multistep method to verify the capability of the proposed method to solve third order DDEs directly.

Keywords: boundary value problem; delay differential equations; multistep method; shooting technique.