

عنوان مقاله:

CHAIN LEAST SQUARES METHOD FOR NUMERICAL SOLUTIONS OF SECOND ORDER DIFFERENTIAL EQUATIONS

محل انتشار:

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خلاصه مقاله:

Rately, in order to increase the efficiency of least squares method in numerical solution of ill-posed problems, the chain least squares method is presented in a recurrent process by Babolian et al. The main purpose of this new method is to increase the efficiency of the least squares method in numerical solution of ill-posed functional and physical equations. Determining the least squares of a given function in an arbitrary set is often an ill-posed problem. In chain least squares method, by defining artificial constraint and using Lagrange multipliers method, the attempt is to turn n -dimensional least squares problems into $(n-1)$ ones, in a way that the condition number of the corresponding system with $(n-1)$ -dimensional problem be low. At first, the new method is introduced for 2 and 3-term basis, then the presented method is generalized for n -term basis. In this research, The aim is to solve the second order linear differential equations with regularized singular points $P(t)y + Q(t)y' + r(t)y = f(t); t \in [0; T]; y(0) = y_0; y'(0) = y_1$; by chain least squares method then, the efficiency of both methods are compared by solving some numerical examples. Although, These functional equation can be solved by the Frobenius series and other numerical methods, but in this article, the aim is to investigate the efficiency of chain least squares method. The numerical results show that the chain least squares method is an accurate and stable method in solving second order differential equations with regularized singular points. It seems that this new method can be efficient for other ill-posed functional equations.

کلمات کلیدی:

Chain least squares method, Differential Equations, singular points

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