

Approximations of Fractional Derivatives and Its Applications in Solving Non-Linear Fractional Variational Problems

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Abstract : The paper presents a numerical method based on operational matrix of integration and Ryleigh method for the solution of a class of non-linear fractional variational problems (NLFVPs). Chebyshev first kind polynomials are used for the construction of operational matrix. Using operational matrix and Ryleigh method the NLFVP is converted into a system of non-linear algebraic equations, and solving these equations we obtained approximate solution for NLFVPs. Convergence analysis of the proposed method is provided. Numerical experiment is done to show the applicability of the proposed numerical method. The obtained numerical results are compared with exact solution and solution obtained from Chebyshev third kind. Further the results are shown graphically for different fractional order involved in the problems.

Keywords : non-linear fractional variational problems, Rayleigh-Ritz method, convergence analysis, error analysis

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