

Faculty of Engineering

Department: Engineering Physics and Mathematics

Name: I.F.Lashien

Title: Polynomial and nonpolynomial spline approaches to the numerical solution of second order boundary value problems

Authors: M.A. Ramadan; I.F.Lashien & W.K.Zahra

Published In: Applied Mathematics and computation,184,476 (2007)

Impact Factor: 0.688

Abstract:

In this paper, quadratic and cubic polynomial and nonpolynomial spline functions based methods are presented to find approximate solutions to second order boundary value problems. Using these spline functions we derive a few consistency relations which to be used for computing approximations to the solution for second order boundary value problems. The present approaches have less computational cost. Convergence analysis of these methods is discussed . Two numerical examples are included to illustrate the practical usefulness of the proposed methods.

Key words:

Quadratic and cubic polynomial splines, nonpolynomial spline, two-point boundary conditions.

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Name: I.F.Lashien

Title: A class of methods based on a septic non-polynomial spline function for the solution of sixth-order two-point boundary value problems

Authors: M.A.Ramadan; I.F.Lashien & W.K. Zahra

Published In: Internation journal of computer mathematics,85,759 (2008)

Impact Factor: 0.428

Abstract:

Two new second and fourth-order methods based on a septic non-polynomial spline function for the numerical solution of sixth-order two-point boundary value problems are presented. The spline function is used to derive some consistency relations for computing approximations to the solution of this problem. The proposed approach gives better approximations than existing polynomial spline and finite difference methods up to order four and has a lower computational cost. Convergence analysis of these two methods is discussed. Three numerical examples are included to illustrate the practical use of our methods as well as their accuracy compared with existing spline function methods.

Key words:

Septic non-polynomial spline; finite difference, two-point boundary value problem; sixth order.