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Solving system of Volterra-Fredholm integral equations with Bernstein polynomials and hybrid Bernstein Block-Pulse functions

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Abstract

This work approximates the unknown functions based on the Bernstein polynomials and hybrid Bernstein Block-Pulse functions, in conjunction with the collocation method for the numerical solution of system of Fredholm-Volterra integral equations. In both methods, the system of integral equations is approximated by the Gauss quadrature formula with respect to the Legendre weight function. The proposed methods reduce the system of integral equations to a system of algebraic equations that can be easily solved by any usual numerical methods. Moreover, the convergence analysis of these algorithms will be shown by preparing some theorems. Numerical experiments are presented to show the superiority and efficiency of proposed methods in comparison with some other well known methods.

Keywords: Bernstein polynomials, System of Volterra-Fredholm integral equations, Convergence analysis, Numerical algorithm, Gaussian quadrature.

2010 MSC: 45G10, 65R20, 68U20, 65C20

1. Introduction

Integral equations, depending on the structure of integrals, have different types, for example Fredholm integral equations, Volterra integral equations and

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