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FIBONACCI WAVELETS APPROACH FOR SOLVING NON LINEAR FREDHOLM INTEGRAL EQUATIONS

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Abstract. In this research article, an effective computational technique is introduced for the numerical solutions of nonlinear Fredholm integral equations (NLFIE) by utilizing the Fibonacci wavelets collocation method. The primary aim of this study is to use Fibonacci wavelets to approximate the nonlinear part of the integral equations. The NLFIE is then reduced to a set of nonlinear algebraic equations. Further, these equations are computed by appropriate techniques, such as the Newton-Raphson technique. Also, the error and convergence analysis of the suggested technique is presented. Several examples are presented to show the effectiveness of the suggested technique. This allows us to evaluate the precision of the number of results. It is worth mentioning that the findings are accurate even when there are few grid points.

1. Introduction

Integral equations play a significant role in various scientific and technological challenges. One of the fundamental methods employed across various domains of applied mathematics involves the utilization of integral equations. They are used in numerous mathematical models and engineering disciplines, including cosmic radiation, image processing, spectroscopy, radiography [8, 29]. Numerous numerical techniques have been created to find the answers to integral equations, such as the triangular function approach [16], the linear multistep method [6], Bernstein's approximation [30], radial basis functions (RBFs) [17], wavelet methods [32, 15, 25] and the modified homotopy perturbation method [18]. Due to the prevalence of integral equations and the fact that there are often no precise solutions, researchers have created a variety of numerical methods to solve these equations by approximating them [25, 11, 7, 4, 20].
Wavelets are mathematical operations that separate data into different frequency

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