Patent Search

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Abstract:

The proposed invention introduces an Enhanced Fixed Point Method for Efficient Numerical Solution of Nonlinear Integral Equations. Nonlinear integral equations ar used in scientific and engineering disciplines to model complex phenomena. However, their solution poses challenges due to their inherent complexity and the abser analytical solutions in most cases. The Enhanced Fixed Point Method addresses these challenges by incorporating innovative numerical techniques and algorithmic improvements. It employs iterative refinement with advanced iteration schemes, adaptive step size control, acceleration techniques, and convergence acceleration st approach ensures faster convergence rates, enhanced stability, and improved accuracy compared to traditional methods. By dynamically adjusting the step size base local behavior of the solution, the method achieves efficient progress towards convergence while maintaining numerical stability. The inclusion of acceleration techni convergence acceleration strategies further enhances computational efficiency. The proposed invention provides a robust and efficient approach for solving nonlinea equations, with significant implications for various scientific and engineering fields, enabling accurate modeling and analysis of complex systems.

Complete Specification

Description:This invention proposes an enhanced fixed point method for efficiently solving nonlinear integral equations. Nonlinear integral equations arise in nume scientific and engineering disciplines, including physics, economics, biology, and control theory. Solving such equations accurately and efficiently is crucial for understanding complex systems and making informed decisions. The proposed enhanced fixed point method combines innovative numerical techniques and algor improvements to provide a more robust and efficient solution approach for these equations.

Background of the invention:

Nonlinear integral equations play a crucial role in various scientific and engineering disciplines, providing powerful mathematical models for describing complex phenomena. These equations arise in diverse fields such as physics, economics, biology, and control theory, and their solution is often a prerequisite for understan behavior of systems and making informed decisions.

The study of nonlinear integral equations has been the focus of extensive research for many years, motivated by the need to develop efficient numerical methods c of providing accurate solutions. Unlike linear integral equations, which can be solved using well-established techniques, nonlinear integral equations present uniqu challenges due to their inherent complexity and the absence of analytical solutions in most cases.

Traditional approaches for solving nonlinear integral equations include iterative schemes, direct methods, and transformation techniques. Iterative methods, such a Newton-Raphson method and fixed point iteration, involve iteratively refining an initial guess until convergence is achieved. These methods are widely used but ofte from slow convergence rates, instability, and difficulties in choosing appropriate initial guesses.

Direct methods, on the other hand, aim to transform the nonlinear integral equation into a system of algebraic equations, which can be solved using linear algebra

View Application Status

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