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(57) Abstract :
The proposed invention introduces an Enhanced Fixed Point Method for Efficient Numerical Solution of Nonlinear Integral Equations. Nonlinear integral equations are widely used in scientific and engineering disciplines to model complex phenomena. However, their solution poses challenges due to their inherent complexity and the absence of 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 strategies. This approach ensures faster convergence rates, enhanced stability, and improved accuracy compared to traditional methods. By dynamically adjusting the step size based on the local behavior of the solution, the method achieves efficient progress towards convergence while maintaining numerical stability. The inclusion of acceleration techniques and convergence acceleration strategies further enhances computational efficiency. The proposed invention provides a robust and efficient approach for solving nonlinear integral equations, with significant implications for various scientific and engineering fields, enabling accurate modeling and analysis of complex systems.

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