A numerical scheme to solve nonlinear integral Fredholm equations using Gauss-Legendre polynomials

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Abstract
In this work, we consider the following nonlinear integral Fredholm equation of the second kind

\[ x(s) = y(s) + \int_a^b k(s, t, x(t))dt \]

We study an iterative method for finding an approximate solution to the nonlinear integral Fredholm equation. We prove the existence and uniqueness of the solution. An approximate method based on the Gauss-Legendre polynomials is proposed and convergence results are obtained. Illustrative examples are included to demonstrate the validity of the technique.

Mots clés. Nonlinear integral Fredholm equations, Gauss-Legendre polynomials, approximate solution.

References