Maleknejad, K.; Derili, H.
Numerical solution of integral equations by using combination of spline-collocation method and Lagrange interpolation. (English) [Zbl 1093.65125]

Summary: We find numerical solutions of

\[ x(t) + \lambda \int_a^b k(t, s)x(s) \, ds = y(t), \quad a \leq t \leq b \]

or

\[ x(t) + \lambda \int_a^t k(t, s)x(s) \, ds = y(t), \quad a \leq t \leq b, \quad a \leq s \leq b \]

by B-splines. We determine the coefficients \( \{\alpha_i\}_{i=0}^{N+1} \) such that

\[ \sum_{i=0}^{N+1} \alpha_i B_i(t) \]

to be an approximation for \( x(t) \).

This method give an approximate solution for the integral equation, and also it is powerful in solving both Fredholm and Volterra integral equations, specially for the first kind. We use special interpolation and quadrature rule for numerical integration.

MSC:

65R20 Numerical methods for integral equations
45B05 Fredholm integral equations
45D05 Volterra integral equations

Keywords:

Lagrange interpolation; spline-collocation method; B-splines; Clenshaw-Curtis quadrature; linear integral equations; Volterra integral equation; Fredholm integral equation; numerical examples; quadrature method

Full Text: DOI

References:


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