Laxmi Panigrahi, Bijaya; Kumar Malik, Jitendra
Chebyshev spectral projection methods for Fredholm integral equations of the second kind. (English) Zbl 07597682

Summary: In this paper, we will propose the Chebyshev spectral Galerkin and collocation methods for the Fredholm integral equations (FIEs) of the second kind with smooth kernel and its associated eigenvalue problem (EVPs). The convergence rates of approximated solutions, iterated solutions with exact solution in $L^2_\omega$ norm have been investigated. We will evaluate the errors between exact eigen-elements and approximated eigen-elements both in $L^2_\omega$ and $L^\infty_\omega$ norms. We will show that eigenvalues and iterated eigenvectors have super-convergence rate in Chebyshev spectral Galerkin methods.

For the entire collection see [Zbl 1491.65006].

MSC:
65R20 Numerical methods for integral equations
45B05 Fredholm integral equations
65R15 Numerical methods for eigenvalue problems in integral equations

Keywords:
Fredholm integral equations; eigenvalue problems; compact integral operator; Chebyshev polynomials

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References:

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