

PRECONDITIONED CONJUGATE GRADIENT METHODS FOR INTEGRAL EQUATIONS OF THE SECOND KIND DEFINED ON THE HALF-LINE

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摘要

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PRECONDITIONED CONJUGATE GRADIENT METHODS FOR INTEGRAL EQUATIONS OF THE SECOND KIND DEFINED ON THE HALF-LINE

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Abstract We consider solving integral equations of the second kind defined on the half-line $[0, \infty)$ by the preconditioned conjugate gradient method. Convergence is known to be slow due to the non-compactness of the associated integral operator. In this paper, we construct two different circulant integral operators to be used as preconditioners for the method to speed up its convergence rate. We prove that if the given integral operator is close to a convolution-type integral operator, then the preconditioned systems will have spectrum clustered around 1 and hence the preconditioned conjugate gradient method will converge superlinearly. Numerical examples are given to illustrate the fast convergence.

Key words

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