EIGENVALUES FOR THE SEMI-CIRCULANT PRECONDITIONING OF ELLIPTIC OPERATORS WITH THE VARIABLE COEFFICIENTS

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ABSTRACT

We investigate the eigenvalues of the semi-circulant preconditioned matrix for the finite difference scheme corresponding to the second-order elliptic operator with the variable coefficients given by $L_v u = -\triangle u + a(x,y)u_x + b(x,y)u_y + d(x,y)u$, where a and b are continuously differentiable functions and d is a positive bounded function. The semi-circulant preconditioning operator $L_c u = -\triangle u + d_c u$. Using the field of values arguments, we show that the eigenvalues of the preconditioned matrix are clustered at some number. Some numerical evidences are also provided.

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