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THE CONVERGENCE RATE OF THE CHEBYSHEV SEMIITERATIVE METHOD UNDER A PERTURBATION OF THE FOCI OF AN ELLIPTIC DOMAIN*

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Abstract. The Chebyshev semiiterative method (CHSIM) is a powerful method for finding the iterative solution of a nonsymmetric real linear system $A\mathbf{x} = \mathbf{b}$ if an ellipse excluding the origin well fits the spectrum of A. The asymptotic rate of convergence of the CHSIM for solving the above system under a perturbation of the foci of the optimal ellipse is studied. Several formulae to approximate the asymptotic rates of convergence, up to the first order of a perturbation, are derived. These generalize the results about the sensitivity of the asymptotic rate of convergence to a perturbation of a real-line segment spectrum by Hageman and Young, and by the first author. A numerical example is given to illustrate the theoretical results.

Key words. Chebyshev semiiterative method, Asymptotic rate of convergence.

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