Operators and Matrices
Volume 6, Number 4 (2012), 735–755
doi:10.7153/oam-06-48

SPECTRA AND APPROXIMATIONS OF A CLASS OF SIGN–SYMMETRIC MATRICES

OLGA Y. KUSHEL

Abstract. A new class of sign-symmetric matrices is introduced in this paper. Such matrices are called J-sign-symmetric. The spectrum of a J-sign-symmetric irreducible matrix is studied under the assumption that its second compound matrix is also J-sign-symmetric. The conditions for such matrices to have complex eigenvalues on the spectral circle are given. The existence of two positive simple eigenvalues $\lambda_1 > \lambda_2 > 0$ of a J-sign-symmetric irreducible matrix A is proved under some additional conditions. The question when the approximation of a J-sign-symmetric matrix with a J-sign-symmetric second compound matrix by strictly J-sign-symmetric matrices with strictly J-sign-symmetric second compound matrices is possible is also answered in this paper.

Mathematics subject classification (2010): Primary 15A48; Secondary 15A18, 15A75.
Keywords and phrases: Totally positive matrices, sign-symmetric matrices, irreducible matrices, compound matrices, exterior powers, Gantmacher–Krein theorem, eigenvalues.

REFERENCES

[1] F. R. GANTMACHER, M. G. KREIN, *Oscillation Matrices and Kernels and Small Vibrations of Mechanical Systems*, AMS Bookstore, 2002.
[2] TSOY-WO MA, *Classical Analysis on Normed Spaces*, World Scientific Publishing, 1995.
[3] I. M. GLAZMAN, JU. I. LIUBICH, *Finite-Dimensional Linear Analysis: A Systematic Presentation in Problem Form*, MIT Press, 1974.
[4] J. L. KELLEY, *General Topology*, Birkhäuser, 1975.
[5] K. KURATOVSKI, *Topology, I, II*, revised 2nd ed., Academic Press, New York, 1966.
[6] F. GANTMACHER, *The Theory of Matrices*, Volume 1, Volume 2, Chelsea, Publ. New York, 1990.
[7] H. MINC, *Nonnegative Matrices*, John Wiley and Sons, New York, 1988.

Paper OaM-06-48