

MATRICES WHOSE POWERS EVENTUALLY HAVE CERTAIN PROPERTIES

CHAO MA, QIMIAO XIE AND JIN ZHONG

Abstract. The matrices whose powers eventually have some special properties is an interesting object of study, such as eventually positive matrices. This paper investigates the matrices whose powers eventually have certain structural properties. We completely characterize those complex square matrices whose powers become and remain diagonal, Toeplitz, normal, respectively.

Mathematics subject classification (2010): 15A21, 15B05.

Keywords and phrases: Power, diagonal matrix, Toeplitz matrix, normal matrix.

REFERENCES

- [1] R. A. BRUALDI AND H. J. RYSER, *Combinatorial Matrix Theory*, Cambridge University Press, 1991.
- [2] R. E. CLINE, R. J. PLEMMONS AND G. WORM, *Generalized inverses of certain Toeplitz matrices*, *Linear Algebra Appl.* **8** (1974), 25–33.
- [3] J. GLÜCK, *Towards a Perron-Frobenius theory for eventually positive operators*, *J. Math. Anal. Appl.* **453** (2017), 317–337.
- [4] L. HOGBEN AND U. WILSON, *Eventual properties of matrices*, *Electron. J. Linear Algebra* **23** (2012), 953–965.
- [5] R. A. HORN AND C. R. JOHNSON, *Matrix Analysis*, 2nd ed., Cambridge University Press, 2013.
- [6] J. J. McDONALD AND P. PAPARELLA, *Matrix roots of imprimitive irreducible nonnegative matrices*, *Linear Algebra Appl.* **498** (2016), 244–261.
- [7] D. NOUTSOS AND M. J. TSATSOMEROS, *Reachability and holdability of nonnegative states*, *SIAM J. Matrix Anal. Appl.* **30** (2008), 700–712.
- [8] F. SHAKERI AND R. ALIZADEH, *Nonnegative and eventually positive matrices*, *Linear Algebra Appl.* **519** (2017), 19–26.
- [9] B.-L. YU, T.-Z. HUANG, C. JIE AND C. DENG, *Potentially eventually positive star sign patterns*, *Electron. J. Linear Algebra* **31** (2016), 541–548.
- [10] X. ZHAN, *Matrix Theory*, Grad. Stud. Math. vol. 147, Amer. Math. Soc., Providence, RI, 2013.