

REMARKS ON THE PRODUCT OF TWO PROJECTIONS

JOHANNES DE ANDRADE BEZERRA

Abstract. In this paper we investigate complex projections A and B so that AB is a diagonalizable matrix. Particularly, we provide necessary and/or sufficient conditions so that AB is a diagonalizable matrix with its eigenvalues belonging to the real segment $[0, 1]$. Moreover, we investigate on eigenspaces and eigenvalues of the product of two projections.

Mathematics subject classification (2020): 15A03, 15A18.

Keywords and phrases: Eigenvalue, eigenspace, diagonalizable matrix, product of two projections, EP matrix.

REFERENCES

- [1] J. K. BAKSALARY, R. KALA, *The matricial equation $AX - BY = C$* , Linear Algebra Appl. **25**, (1979), 41–43.
- [2] C. S. BALLANTINE, *Products of idempotent matrices*, Linear Algebra Appl. **19**, (1978), 81–86.
- [3] T. S. BASKETT, I. J. KATZ, *Theorems on product of EP_r matrices*, Linear Algebra Appl. **2**, (1969), 87–103.
- [4] J. A. BEZERRA, *A note on completion to the unitary matrices*, Linear Multilinear Algebra **69**, (2019), 1825–1840.
- [5] J. A. BEZERRA, *A note on the product of two matrices of index one*, Linear Multilinear Algebra **65**, (2016), 1479–1492.
- [6] J. GROSS, *On the product of orthogonal projectors*, Linear Multilinear Algebra **289**, (199), 141–150.
- [7] J. GROSS, G. TRENKLER, *On the product of oblique projectors*, Linear Multilinear Algebra **44**, (1997), 247–259.
- [8] R. A. HORN, C. R. JOHNSON, *Matrix analysis*, Cambridge University Press, New York, 2013.
- [9] J. J. KOLIHA, *A simple proof of the product theorem for EP matrices*, Linear Algebra Appl. **294**, (1999), 213–215.
- [10] A. KÖRPERAL, B. REGENSBURGER, *On the product of projectors and generalized inverses*, Linear Multilinear Algebra **62**, (2014), 1567–1582.
- [11] V. V. PRASOLOV, *Problems and theorems in linear algebra*, AMS, Raleigh, 1994.
- [12] Y. TIAN, G. P. H. STYAN, *Rank equalities for idempotent and involutory matrices*, Linear Algebra Appl. **335**, (2001), 101–117.