

## ON MAPS SENDING RANK- $\kappa$ IDEMPOTENTS TO IDEMPOTENTS

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*Abstract.* We characterize bijective linear maps on complex-valued  $n \times n$  matrices such that rank- $\kappa$  idempotents are mapped to idempotents, where  $2 \leq \kappa < n - 1$ .

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### REFERENCES

- [1] L. B. BEASLEY, *Linear transformations on matrices: The invariance of rank  $k$  matrices*, Linear Algebra and Appl., **3** (1970), 407–427.
- [2] M. BREŠAR AND P. ŠEMRL, *On local automorphisms and mappings that preserve idempotents*, Canad. J. Math., **45**(3) (1993), 483–496.
- [3] M. BREŠAR AND P. ŠEMRL, *On local automorphisms and mappings that preserve idempotents*, Studia Math., **113**(2) (1995), 101–108.
- [4] M. BREŠAR AND P. ŠMERL, *Linear preservers on  $\mathcal{B}(X)$* , Banach Center Publications, **38** (1997), 49–58.
- [5] M. A. CHEBOTAR, W.-F. KE, AND P.-H. LEE, *On maps preserving square-zero matrices*, J. Algebra, **289**(2) (2005), 421–445.
- [6] W. JING, P. LI, AND S. LU, *Additive mappings that preserve rank one nilpotent operators*, Linear Algebra Appl., **367** (2003), 213–224.
- [7] B. KUZMA, *Additive mappings preserving rank-one idempotents*, Acta Math. Sin (Engl. Ser.), **21**(6) (2005), 1399–1406.
- [8] C. LI AND N. TSING, *Linear preserver problems: a brief introduction and some special techniques*, Linear Algebra Appl., **289**(2) (1992), 217–235.
- [9] M. OMLADIĆ AND P. ŠEMRL, *Additive mappings preserving operators of rank one*, Linear Algebra Appl., **182** (1993), 239–256.
- [10] M. PANKOV, *Wigner’s type theorem in terms of linear operators which send projections of a fixed rank to projections of other fixed rank*, J. Math. Anal. Appl., **474**(2) (2019), 1238–1249.
- [11] P. ŠEMRL, *Linear mappings preserving square-zero matrices*, Bull. Austral. Math. Soc., **48**(3) (1993), 365–370.