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LINES OF FULL RANK MATRICES IN LARGE SUBSPACES

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Abstract. Let n and p be non-negative integers with $n \geqslant p$, and S be a linear subspace of the space of all n by p matrices with entries in a field $\mathbb{K}$. A classical theorem of Flanders states that S contains a matrix with rank p whenever $\operatorname{codim} S < n$.

In this article, we prove the following related result: if $\operatorname{codim} S < n-1$, then, for any non-zero n by p matrix N with rank less than p, there exists a line that is directed by N, has a common point with S and contains only rank p matrices.

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REFERENCES

[1] J. DIEUDONNÉ, *Sur une généralisation du groupe orthogonal à quatre variables*, Arch. Math. vol. 1 (1948), 282–287.
[2] H. FLANDERS, *On spaces of linear transformations with bounded rank*, J. Lond. Math. Soc., vol. 37 (1962), 10–16.
[3] R. MESHULAM, *On the maximal rank in a subspace of matrices*, Quart. J. Math. Oxford (2), vol. 36 (1985), 225–229.
[4] C. DE SEGUINS PAZZIS, *Range-compatible homomorphisms on matrix spaces*, Linear Algebra Appl., vol. 484 (2015), 237–289.
[5] C. DE SEGUINS PAZZIS, *The affine preservers of non-singular matrices*, Arch. Math., vol. 95 (2010), 333–342.
[6] C. DE SEGUINS PAZZIS, *The Flanders theorem over division rings*, Linear Algebra Appl., vol. 493 (2016), 313–322.

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