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A SURJECTIVITY PROBLEM FOR 3 BY 3 MATRICES

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Abstract. Let P be a complex polynomial. We prove that the associated polynomial matrix-valued function $\tilde{P}$ is surjective if and only if for each $\lambda \in \mathbb{C}$ the polynomial $P - \lambda$ has at least a simple zero.

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REFERENCES

[1] J. AX, *The elementary theory of finite fields*, Ann. Math. Second Ser. **1968**, 88: 239–271.
[2] N. DUNFORD AND S. SCHWARTZ, *Linear Operators, Part 1, General Theory*, Interscience, New York (1958).
[3] I. GOHBERG, S. GOLDBERG AND M. A. KAASHOEK, *Classes of Linear Operators* Vol. 1, Birkhauser, 1991.
[4] R. HORN, C. JOHNSON, *Matrix Analysis*, Cambridge University Press, 2013.
[5] S. G. KRANTZ, *Dictionary of Algebra Arithmetic and Trigonometry*, CRC Press, 2000.

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