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ELA

ON SPACES OF MATRICES WITH A BOUNDED NUMBER OF EIGENVALUES*

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Dedicated to Hans Schneider on the occasion of his seventieth birthday

Abstract. The following problem, originally proposed by Omladič and Šemrl [*Linear Algebra Appl.*, 249:29–46 (1996)], is considered. Let k and n be positive integers such that $k < n$. Let L be a subspace of $M_n(F)$, the space of $n \times n$ matrices over a field F, such that each $A \in L$ has at most k distinct eigenvalues (in the algebraic closure of F). Then, what is the maximal dimension of L. Omladič and Šemrl assumed that $F = \mathbb{C}$ and solved the problem for $k = 1$, $k = 2$ and n odd, and $k = n - 1$ (under a mild assumption). In this paper, their results for $k = 1$ and $k = n - 1$ are extended to any F such that $\mathrm{char}(F) = 0$, and a solution for $k = 2$ and any n, and for $k = 3$ is given.

Key words. Distinct eigenvalues; cornal ordering; irreducible polynomial.

AMS subject classifications. 15A42; 15A45.

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