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DETERMINANT PRESERVING TRANSFORMATIONS ON SYMMETRIC MATRIX SPACES*

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Abstract. Let $S_n(\mathbf{F})$ be the vector space of $n \times n$ symmetric matrices over a field $\mathbf{F}$ (with certain restrictions on cardinality and characteristic). The transformations ϕ on the space which satisfy one of the following conditions:

1. $\det(A + \lambda B) = \det(\phi(A) + \lambda\phi(B))$ for all $A, B \in S_n(\mathbf{F})$ and $\lambda \in \mathbf{F}$;
2. ϕ is surjective and $\det(A + \lambda B) = \det(\phi(A) + \lambda\phi(B))$ for all A, B and two specific λ;
3. ϕ is additive and preserves determinant

are characterized.

Key words. Linear preserving problem, Rank, Symmetric matrix, Determinant.

AMS subject classifications. 15A03, 15A04.

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