NONLINEAR MAPS PRESERVING HIGHER–DIMENSIONAL NUMERICAL RANGE OF SKEW LIE PRODUCT OF OPERATORS

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Abstract. Let $k$ be a positive integer. Let $H$ and $K$ be complex Hilbert spaces of dimensions greater than $k$. By $W_k(A)$ denote the $k$-dimensional numerical range of an operator $A$. In this paper we prove that a surjective map $\phi : B(H) \to B(K)$ satisfies $W_k(AB - BA^*) = W_k(\phi(A)\phi(B) - \phi(B)\phi(A)^*)$ for all $A, B \in B(H)$ if and only if there exists a unitary operator $U \in B(H, K)$ such that $\phi(A) = \gamma UAU^*$ for all $A \in B(H)$, where $\gamma \in \{-1, 1\}$.

Keywords and phrases: Higher-dimensional numerical range, skew Lie product.

REFERENCES


