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Characterization of Non Linear Maps Commuting with the λ -Aluthge Transform under Jordan Product

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Abstract

Let $B(H)$ denote the algebra of all bounded linear operators acting on a complex Hilbert space H with $\dim H \geq 2$. For each $T \in B(H)$, there exists a unique partial isometry $V \in B(H)$ such that $T = V|T|$ and $\ker(V) = \ker(T)$, where $|T| = (T^*T)^{1/2}$.

For $\lambda \in [0,1]$, the λ -Aluthge transform is defined by $\Delta_\lambda(T) = |T|^\lambda V|T|^{1-\lambda}$, for $T \in B(H)$,

where $T = V|T|$ is the polar decomposition of T .

Let $\varphi : B(H) \rightarrow B(K)$ be a bijective map. We say that φ commutes with the λ -Aluthge transform for the Jordan product $A * B = 1/2 (AB + BA)$ if $\Delta_\lambda(\varphi(A) * \varphi(B)) = \varphi(\Delta_\lambda(A * B))$ for all $A, B \in B(H)$.

In this work, we present a complete characterization of all bijective maps φ satisfying this property.

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