Additive minimal–rank nonincreasing maps on ✠-hermitian/✠-skew-hermitian matrices

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(Joint work with B. Kuzma)

Let $\mathbb{K}$ be a field, $\mathcal{M}_n(\mathbb{K})$ the algebra of all n–by–n matrices with entries from $\mathbb{K}$, and $✠ : \mathcal{M}_n(\mathbb{K}) \to \mathcal{M}_n(\mathbb{K})$ an involution. A matrix $A \in \mathcal{M}_n(\mathbb{K})$ is ✠-*hermitian* (resp. ✠-*skew-hermitian*) if $✠(A) := A^{✠} = A$ (resp. $A^{✠} = -A$). The set of all such matrices is denoted by $\mathcal{H}_n^{✠}(\mathbb{K})$ (resp. $\mathcal{SH}_n^{✠}(\mathbb{K})$). The minimal (nonzero) rank is defined as $r_{min} := \min\{\operatorname{rk} A \,|\, 0 \neq A \in \mathcal{H}_n^{✠}(\mathbb{K})\}$ (resp. $r_{min} := \min\{\operatorname{rk} A \,|\, 0 \neq A \in \mathcal{SH}_n^{✠}(\mathbb{K})\}$). A map Φ is *minimal–rank nonincreasing* if for any A, $\operatorname{rk} A = r_{min}$ implies $\operatorname{rk} \Phi(A) \leq r_{min}$. The classification of all such additive maps on $\mathcal{H}_n^{✠}(\mathbb{K})$ (resp. $\mathcal{SH}_n^{✠}(\mathbb{K})$) will be presented.