Characterization of k-disjointness Preserving Non-linear Operators Between Banach Lattices

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Abstract

A map $T$, not necessarily linear, between two Banach lattices $E$ and $F$ is said to preserve k-disjointness if $T(f_1) \wedge T(f_2) \wedge \ldots \wedge T(f_k) = 0$, whenever $f_1, f_2, \ldots, f_k$ are $k$ mutually disjoint positive elements in $E$ and $k$ is the smallest natural number with this property. Certain k-disjointness preserving maps are characterized in terms of cardinality of subsets of $X$, where $C^\infty(X)$ is a representation space of $E$. This facilitates a decomposition of a k-disjoint non-linear operator into a sum of disjointness preserving operators.