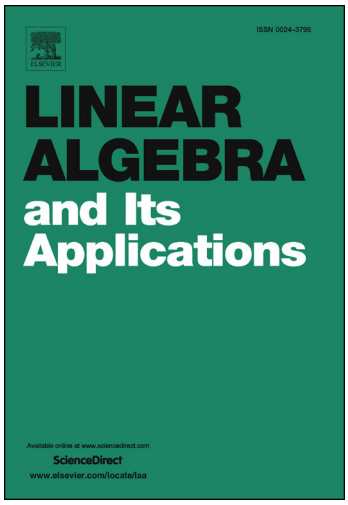

On the connectedness of spectral sets and irreducibility of spectral cones in Euclidean Jordan algebras

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On the connectedness of spectral sets and irreducibility of spectral cones in Euclidean Jordan algebras

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Abstract

Let $\mathcal{V}$ be a Euclidean Jordan algebra of rank n. A set E in $\mathcal{V}$ is said to be a *spectral set* if there exists a permutation invariant set Q in $\mathcal{R}^n$ such that $E = \lambda^{-1}(Q)$, where $\lambda : \mathcal{V} \to \mathcal{R}^n$ is the *eigenvalue map* that takes $x \in \mathcal{V}$ to $\lambda(x)$ (the vector of eigenvalues of x written in the decreasing order). If the above Q is also a convex cone, we say that E is a *spectral cone*. This paper deals with connectedness and arcwise connectedness properties of spectral sets. By relying on the result that in a simple Euclidean Jordan algebra, every eigenvalue orbit $[x] := \{y : \lambda(y) = \lambda(x)\}$ is arcwise connected, we show that if a permutation invariant set Q is connected (arcwise connected), then $\lambda^{-1}(Q)$ is connected (respectively, arcwise connected). A related result is that in a simple Euclidean Jordan algebra, every pointed spectral cone is irreducible.

Key Words: Euclidean Jordan algebra, spectral set, connectedness, irreducible cone

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