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Graphs and Cone Preserving Maps

George P. Barker

University of Missouri, Kansas City

Abstract

Let V be a finite dimensional real vector space which is partially ordered by a (closed, pointed, full) cone K. When V is $\mathbb{R}$ and K is the nonnegative orthant, that is, the cone of entrywise nonnegative vectors, then for any entrywise nonnegative matrix A we have the associated directed graph $G(A)$ with vertices $\{1, ..., n\}$ and edges (i, j) if and only if the i, j entry of A is positive. For a general K and a cone preserving map A we have extensions of the concepts of irreducible and of primitive operators. We also extend the notion of the associated graph in several ways. The irreducibility or primitivity of A is related to the strong connectedness of one of the graphs associated with A. Finally, we have that the strong connectedness of one of these graphs for any irreducible A implies that K is (isomorphic with) the nonnegative orthant.

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Place: **IMBM Seminar Room, Boğaziçi University**