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Title: Lattices of logmodular algebras.

Abstract

A classical theorem of Cholesky states that any positive and invertible complex matrix can be written in the form U^*U, for some upper triangular matrix U. We are looking at generalizations of this result in the context of operator algebras. Note that upper triangular matrices form an algebra whose invariant subspaces are nested.

A subalgebra $\mathcal{A}$ of a C^*-algebra $\mathcal{M}$ is said to be *logmodular* if the collection $\{a^*a : a \text{ invertible and } a, a^{-1} \in \mathcal{A}\}$ is norm dense in $\mathcal{M}$. There are large classes of well studied algebras, both in commutative and non-commutative settings, which are known to be logmodular. We show that the lattice of projections in a von Neumann algebra $\mathcal{M}$, whose ranges are invariant under a logmodular algebra $\mathcal{A}$ in $\mathcal{M}$ is a commutative subspace lattice. Further, if $\mathcal{M}$ is a factor then this lattice is a nest. As a special case, it follows that all reflexive logmodular subalgebras of type I factors are nest algebras, and this answers a question of Paulsen and Raghupathi. The result has implications to the study of C^*-extreme points of completely positive maps. This is based on a joint work with Manish Kumar.