Continuous affine families of unitary Hadamard matrices

Wojciech Tadej

Cardinal Stefan Wyszyński University, Warszawa, Poland

Abstract

A unitary Hadamard matrix is understood here as an $N \times N$ unitary matrix with all its entries having moduli equal to $1/\sqrt{N}$.

By an affine family of unitary Hadamard matrices stemming from H a set of the form: $\{H \circ \mathbf{EXP}(\mathbf{i}R) : \ R \in \mathcal{R}\}$, is meant, where H is an $N \times N$ unitary Hadamard matrix, $\circ$ denotes the Hadamard product, **EXP** denotes the entrywise exp operation on a matrix, and $\mathcal{R}$ is a subspace of real $N \times N$ matrices.

The most general way of constructing such affine families will be presented, being a serious combinatorial problem. A conjecture on the relevant calculational method, involving solution of an algebraic system, will be discussed.

Keywords

Hadamard matrices, complex Hadamard matrices.