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On a new class of Hadamard matrices

A complex Hadamard matrix is a square matrix whose each entry is a complex number with absolute value 1, and whose any two distinct rows are orthogonal. In this talk we focus on the class of complex Hadamard matrices called S-Hadamard, which satisfy the additional condition that the elementwise product of the matrix with itself (Schur product) is also a complex Hadamard matrix. We will discuss algebraic constructions of such matrices using finite fields, as well as various methods that can be employed for computational constructions. Our recently discovered parametric construction provides further insight into possible structure of these matrices. Existence results will be presented; for some matrix orders the existence question remains open. The study of these matrices is motived by an application in quantum information theory.