

Generalized Hadamard Matrices and Applications

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Abstract

Let $(G, +)$ be a group of order g . A $(g, k; \lambda)$ -difference matrix is a $k \times g\lambda$ matrix $H = (g_{ij})$ with entries from G , so that for each $1 \leq i < j \leq k$, the multiset

$$\{g_{i\ell} + g_{j\ell}^{-1} : 1 \leq \ell \leq g\lambda\}$$

contains every element of G exactly λ times.

A *generalized Hadamard matrix* $GH(g, \lambda)$ is a $(g, g\lambda; \lambda)$ -difference matrix.

Some interesting examples of difference matrices and generalized Hadamard matrices with emphasis on their applications to designs and association schemes will be discussed.