
HADI KHARAGHANI, University of Lethbridge

On productive Hadamard matrices

A regular Hadamard matrix with row sum $2h$ is called *productive* if there is a set \mathcal{H} of matrices with row sum $2h$ and a cyclic group $G = \langle \sigma \rangle$ where $\sigma: \mathcal{H} \rightarrow \mathcal{H}$ is a bijection, such that

1. $H \in \mathcal{H}$,
2. For any $H_1, H_2 \in \mathcal{H}$, $(\sigma H_1)(\sigma H_2)^t = H_1 H_2^t$,
3. $|G| = 4|h|$,
4. $\sum_{\theta \in G} \theta H = 2 \frac{h}{|h|} J$.

We show that for each integer n for which there is a Hadamard matrix of order $4n$ and $8n^2 - 1$ is a prime number, there is a productive regular Hadamard matrix of order $16n^2(8n^2 - 1)^2$. Applications include a new class of symmetric designs.

This is a joint work with Majid Behbahani.