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Complex Hadamard matrices and distance regular graphs

Let A be the adjacency matrix of a graph X on n vertices. The continuous-time quantum walk on a graph X is given by the transition operator e^{-itA}. We say the continuous-time quantum walk on X is instantaneous uniform mixing at time τ if

$$|e^{-i\tau A}|_{uv} = \frac{1}{\sqrt{n}}, \qquad \text{for all vertices } u \text{ and } v.$$

This condition is equivalent to $\sqrt{n}e^{-i\tau A}$ being a complex Hadamard matrix. Hence, if a graph admits instantaneous uniform mixing then its adjacency algebra contains a complex Hadamard matrix. In this talk, we search for complex Hadamard matrices in the adjacency algebra of distance regular graphs.