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Hadamard diagonalizability and generalizations

An n -by- n matrix H is a *Hadamard matrix* if $HH^T = nI$. We say that a matrix M is *Hadamard diagonalizable* if $M = \frac{1}{n}HDH^T$ for some diagonal matrix D . In the context of graphs, we say that a graph X is *Hadamard diagonalizable* if its Laplacian matrix L is Hadamard diagonalizable. In this talk, we give an overview of results about the properties of Hadamard diagonalizable matrices and graphs, and discuss some generalizations. This talk is based on the work of Barik et al. (2011), Johnston et al. (2017), Chan et al. (2020), Breen et al. (2022), and McLaren et al. (2023).