

## **Hadamard diagonalizable graphs of small order**

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A graph whose Laplacian matrix has a full set of eigenvectors with entries in  $\{1, -1\}$  is said to be Hadamard diagonalizable (i.e. there exists a Hadamard matrix which diagonalizes the Laplacian matrix). We demonstrate that the only diagonalizable graphs on  $n = 8k+4$  vertices are  $K_n$  and  $K_{n/2, n/2}$  together with their complements. We also give an exponential time algorithm that takes as input a Hadamard matrix and finds all graphs which are diagonalized by that matrix. Using this all graphs through order 36 which are Hadamard diagonalizable have been found.

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