SUBMATRICES OF HADAMARD MATRICES:
COMPLEMENTATION RESULTS

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Abstract. Two submatrices $A, D$ of a Hadamard matrix $H$ are called complementary if, up to a permutation of rows and columns, $H = \begin{bmatrix} A & B \\ C & D \end{bmatrix}$. In this paper, an explicit formula for the polar decomposition of $D$ is found. As an application, it is shown that under suitable smallness assumptions on the size of $A$, the complementary matrix $D$ is an almost Hadamard sign pattern, i.e., its rescaled polar part is an almost Hadamard matrix.

Key words. Hadamard matrix, Almost Hadamard matrix.

AMS subject classifications. 15B34.

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