

Complex Hadamard matrices with special structure

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Abstract

Recent results on two-unitary complex Hadamard matrices will be presented. Such Hadamard matrices, defined for squared dimensions d^2 , remain unitary after partial transpose and reshuffling. These matrices, important for applications in theory of quantum information (generation of absolutely maximally entangled states of four systems with d levels each, quantum error correction codes) do not exist for $d = 2$ but can be constructed [1] for $d = 3, 4, 5$. In this talk we are going to present such a matrix for $d = 6$, which belongs to the Butson class $B(36, 6)$ and is directly related to the quantum analog of the Euler problem of 36 officers [2].

References

- [1] W. Bruzda, G. Rajchel-Mieldzióć, K. Życzkowski, Multi-Unitary Complex Hadamard Matrices, *Open Systems Inform. Dynamics* **31**, 2450008 (2024).
- [2] W. Bruzda and K. Życzkowski, Two-Unitary Complex Hadamard Matrices of Order 36, *Special Matrices* **12**, 20240010, (2024).