Binary and ternary extremal cocyclic self-dual codes

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Abstract

Self-dual codes are an important class of linear codes for both theoretical and practical purposes. The classical reference in the subject is [11]. From time to time, some classifications of binary and ternary self-dual codes are described (see [1], [6], [5] and the references there cited, for instance). Several techniques are known to construct doubly-even ([13]), singly-even ([7]) and ternary ([4]) self-dual codes from Hadamard matrices. This way, Hadamard matrices are a potential source for extremal binary and ternary self-dual codes. Unfortunately, manipulating Hadamard equivalence classes for orders greater than 32 (even for order 32, see [9]) seems to be unfeasible for the moment. The use of cocyclic Hadamard matrices might be an interesting alternative, as indicated in [8]. In fact, very recently, cocyclic Hadamard matrices of order less than 40 have been completely classified up to Hadamard equivalence in [10]. And cocyclic Hadamard matrices have been already used to construct (extremal) self-dual codes [2], [3], [12]. In this work we describe (extremal) binary and ternary self-dual codes obtained from cocyclic Hadamard matrices over dihedral groups D_{4t} and abelian groups $\mathbb{Z}_2^2 \times \mathbb{Z}_t$ for $t \leq 11$.

Keywords

Self-dual code, Extremal code, Hadamard matrix.

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