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# On the permutation decoding for binary linear and $Z_4$-linear Hadamard codes

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Permutation decoding is a technique, introduced in [3] by MacWilliams, that strongly depends on the existence of special subsets, called PD-sets, of the permutation automorphism group $\mathrm{PAut}(C)$ of a linear code $C$. In [2], it is shown how to find $s$-PD-sets of minimum size $s+1$ for partial permutation decoding for the binary simplex code $S_m$ of length $2^m-1$, for all $m \geq 4$ and $1 < s \leq \left\lfloor \frac{2^m-m-1}{m} \right\rfloor$. In [1], an alternative permutation decoding method is presented, which can be applied to any binary systematic code (not necessarily linear), in particular to any $\mathbb{Z}_4$-linear code. Nevertheless, this alternative method assumes that we know an appropriate PD-set for such codes.

In this talk, we obtain $s$-PD-sets of size $s+1$ for binary linear Hadamard codes (extended codes of $S_m$), following the techniques described in [2]. Furthermore, we provide a criterion to obtain $s$-PD-sets of the same size for partial permutation decoding for $\mathbb{Z}_4$-linear codes. As particular examples, we apply this criterion to (nonlinear) Hadamard $\mathbb{Z}_4$-linear codes, where we also prove that such sets are of minimum size. Finally, we present two recursive constructions to obtain $s$-PD-set for this family of Hadamard $\mathbb{Z}_4$-linear codes.

## Referencias

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