Some Families of $\mathbb{Z}_4$-Cyclic Codes and their binary images

(I and II)

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After the publication of [1], which solved the old problem of the formal duality of Kerdock and Preparata codes by using cyclic codes over $\mathbb{Z}_4 = \mathbb{Z}/4\mathbb{Z}$ (ring of integer modulo 4) and the Gray map, this kind of codes has been extensively studied. The Nechaev-Gray map (introduced in [4]) also plays an important role. The action of these two transforms on $\mathbb{Z}_4$-cyclic codes (linear or not) was considered in [4] and [5]. This way gives rise to constructions of new interesting binary codes obtained from $\mathbb{Z}_4$-linear cyclic codes. On the other hand, $\mathbb{Z}_4$-cyclic which are self-dual codes were used to study and construct important lattices and $\mathbb{F}_2$-self-dual codes (see [3]).

In this work, we introduce and solve several problems on $\mathbb{Z}_4$-cyclic codes (non necessarily linear) and we use these results to present a family of $\mathbb{Z}_4$-self-dual linear cyclic codes. In particular we generalize some results of [3].

References


