

Abstract

The structures of negacyclic codes over the local non-principal ideal ring $R = \mathbb{Z}_4[v]/\langle v^2 + 2v \rangle$ of length $2n$ are presented, where n is odd, and a complete classification of all these codes is obtained. Then the cardinality and the dual code for each code are given, and self-dual codes among these codes are determined.

Especially, all negacyclic codes over R of length $2M_p$ and the self-dual codes among them are presented precisely, where M_p is a Mersenne prime.

Finally, some new and good self-dual 2 -quasi-twisted linear codes over \mathbb{Z}_4 are obtained by use of a \mathbb{Z}_4 -linear Gray map from R onto \mathbb{Z}_4^2 .