Abstract

Quasi-cyclic Codes from Cyclic-Structured Designs with Good Properties

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Quasi-cyclic (QC) codes form an important class of linear codes, which contains the well-known class of cyclic codes. A linear code with a complementary dual (an LCD code) is a linear code C whose dual code $C^{\perp}$ satisfies $C \cap C^{\perp} = \{0\}$. Linear codes with complementary duals meet the asymptotic Gilbert-Varshamov bound. Recently, some binary QC codes of long rate have been found by utilizing a genetic algorithm. Our approach was based on a search for good or best codes that attain the current best known lower bounds on the minimum distance of linear codes, formulated as a combinatorial optimization problem. Some new QC codes belonging to the class of complementary dual binary QC codes, were also presented. The mathematical structure of the later codes is explored and a connection between LCD QC codes and cyclic-structured designs, is given. These formalisms prove to be promising for future research over larger prime fields.