MAXIMUM RANK DISTANCE CODES WITH COMPLEMENTARY DUALS: AN APPLICATION TO F-ADDER CHANNEL

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Linear code with a complementary dual (an LCD code) is a linear code $C$ whose dual code $C^\perp$ satisfies $C \cap C^\perp = \{0\}$. Much research has been done on the LCD codes for the linear codes with Hamming metric. Since the Hamming codes have their own limitations for they cannot in many cases correct or detect complicated error patterns, we are interested in studying linear codes with rank metric. The study of LCD codes was first initiated by J. L. Massey 1992. LCD codes with Hamming metric has been studied so far. We in this paper initiate the study of LCD codes with Rank metric over F-Adder Channel. Maximum Rank
Distance (MRD) codes are linear Rank Distance codes which attain the single-like bound. These codes were introduced by E. M. Gabidulin in the year 1985. MRD codes correct more error patterns compared to those codes with other metrics. The significance of these codes is that they recognize the linear dependence between different alphabet symbol.

We enumerate the complimentary duals for linear codes with Rank Metric; specifically for the Maximum Rank Distance codes. It is shown that MRD codes are LCD codes. The algebraic characterization of Maximum Rank Distance codes with complementary dual is given. LCD codes are shown to provide an optimal linear coding solution over the newly defined F-Adder Channel.