

A NOTE ON ERASURE DECODING OF MAXIMUM RANK DISTANCE CODES

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Algebraic coding theory is required in communication systems to combat the errors that occur in transmission. Designing a code for correction involves the problem of selecting an appropriate metric which maximizes the error correcting capability of the code. The Hamming metric is the most widely used metric for a code defined over a Galois field of prime order. However for a code defined over a higher dimensional Galois field this metric is inappropriate. MRD codes introduced by E.M. Gabidulin happens to be an widely studied code and this code is capable of finding the error in more complicated situations.

Here we study erasures. Erasures are events when the demodulator does not guess at all on certain transmissions when the evidence does not clearly indicate one signal as the most probable. This paper gives a method for erasure decoding of MRD codes.

We mainly prove

1. Let $C [n, 1]$ be a $(n, 1, n)$ MRD code defined over $GF(2^n)$ where $n = 2t + 1$. Let $x = (x_1, x_2, \dots, x_n)$ be the transmitted codeword. Let $y = (y_1, y_2, \dots, y_n)$ be the received vector where t coordinates are erasures or blank spaces. Let $*_1, *_2, \dots, *_t$ denote the t erasures or t blank spaces.

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- Then $*_{s+1}$, where $s+1 \leq t$ can be chosen in $2^{n-t+s} [2^{t-s}-1]$ way by using the guessing process.
2. Let $C[n, 1]$ be a $(n, 1, n)$ MRD code with minimum distance $n = 2t + 1$. Then $C[n,1]$ corrects atmost t -erasures and detects more than t erasures.
 3. Let $C[n,1]$ be a $(n,1,n)$ MRD code defined over $GF(2^n)$ where $n = 2t + 1$. Let $x = (x_1, x_2, \dots, x_n)$ be the transmitted codeword. Let $y = (y_1, y_2, \dots, y_n)$ be the received vector where t coordinates are erasures. Let $*_1, *_2, \dots, *_t$ denote the t erasures. Then erasures $*_{s+1}$ where $s+1 \leq t$ can be chosen in $2^{n-t+s} [2^{t-s}-1]$ ways by using the guessing process. Then the various choices of the $*_j$'s does not affect the erasure correcting capability of the MRD code.

We also illustrate this by an example.

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