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SEMINARIO

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"Polynomial Approach to Construct Cyclic Subspace Codes"

Abstract: Subspace codes and particularly constant dimensional subspace codes are the main mathematical objects in random network coding due to their error correction capability given in [2]. In particular, cyclic subspace codes are very useful subspace codes with efficient encoding and decoding algorithms. In [1] the authors provided a method to construct cyclic subspace codes using subspace polynomials. They have given an explicit construction of cyclic codes of size $n\ (q^N-1)/(q-1)$ and distance $2k-2$ where N is the length, k is the dimension, n is a prime dividing N, and q is the size of the field that codewords are over. In this study we improve and generalize their construction by increasing the size up to $(q^n-1)(q^N-1)/(q-1)$. We also give a general condition for the sets of subspace polynomials used to construct these codes, so that we obtain more diverse sets and more diverse N values. Later on, we obtain the theorem for the distance not only $2k-2$ but also $2k-2s$, where s is a positive integer less than or equal to k.

[1] E. Ben-Sasson, T. Etzion, A. Gabizon and N. Raviv, *Subspace polynomials and cyclic subspace codes*, Proc. of IEEE Inf. Symp. on Inf. Theory (ISIT 2015), pp. 586-590.

[2] R. Kötter and F. R. Kschischang, *Coding for errors and erasures in random network coding*, IEEE Trans. on Inf. Theory **54** (2008), pp. 101-112.

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