

Discrete Mathematics Seminar

Illinois State University

2:00–2:50 pm, August 27

Speaker: Papa A. Sissokho, Illinois State University

On k -independent set of subspaces

Let \mathbb{F}_q^m denote the vector space of dimension m over the field \mathbb{F}_q . We define a k -independent set of subspaces (k -ISS) of \mathbb{F}_q^m to be a set \mathcal{P} of subspaces from \mathbb{F}_q^m such that $|\mathcal{P}| \geq k$ and any subset of k distinct subspaces of \mathcal{P} is independent. A k -ISS is *maximal* if it is not contained in a larger k -ISS. We show that any k -ISS can be used to construct a mixed error-correcting code C with minimum Hamming distance at least $k + 1$. Moreover, if a k -ISS is maximal and $k \geq 2$, then the covering radius of C is at most $k - 1$. In particular, C is quasi-perfect if $k \in \{3, 4\}$. The case $k = 2$ yields perfect codes and is a well-known result of Herzog and Schönheim. Finally, we show that if certain necessary conditions are satisfied, then C is a mixed MDS code.

