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Robust Colorings of the Hamming-Distance Graph.

The Hamming-Distance Graph, $H_q(n,d)$, is defined as the graph with vertex set $\mathbb{Z}_q^n$ where two vertices are adjacent if their Hamming distance is at least d. Cliques of $H_q(n,d)$ correspond to q-ary block codes of length n and Hamming distance at least d. In a paper by Rouayheb et al., the authors use graph theoretical techniques applied to $H_q(n,d)$ to produce new proofs for many classical bounds on error-correcting codes. Moreover, they determine the chromatic number of this graph for many parameters.

A result by Greenwell/Lovász exists which states that $\chi(H_q(n,n)) = q$ for all n and that all minimal colorings of $H_q(n,n)$ are coordinate colorings, meaning the color of every vertex is assigned as its value in a fixed coordinate. For $d < n$, we can color $H_q(n,d)$ in a similar way using $n-d+1$ coordinates. Moreover, the results from Rouayeb et al. show that these coordinate colorings are minimal colorings for all parameters for which the authors were able to determine the chromatic number of the graph. However, it is easily demonstrated that these coordinate colorings are not the only minimal colorings when $d < n$.

In this talk, we will present an analog of the result of Greenwell/Lovász which holds for the case $q = 2$ and $d = n-1$. (Received August 30, 2016)