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Generalized Covering Radii of Melas Codes

Generalized covering radii are a recently introduced hierarchy of parameters for linear codes, motivated by their applications to database linear querying. They extend the classical covering radius and can be formulated as a natural subspace design problem. Let $\mathcal{C}$ be a linear code over $\mathbb{F}_q$ with an $(n-k) \times n$ parity-check matrix H. The t-th generalized covering radius of $\mathcal{C}$ is the smallest positive integer r such that every t-subset of $\mathbb{F}_q^{n-k}$ lies in the span of some r columns of H. Exact values of these parameters are known for very few families of codes. Combine a counting argument with a careful character sum analysis, we obtain general lower and upper bounds on the generalized covering radii of Melas codes. As a consequence, we determine the second generalized covering radius of every Melas code.

This talk is based on joint work with Maosheng Xiong (Hong Kong University of Science and Technology).