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Algebraic methods for parameterized linear codes arising from graphs

Let K be a finite field and let X be a subset of a projective space \mathbb{P}^{s-1} , over the field K , which is parameterized by square-free monomials defined by the edges of a graph G . Let $I(X)$ be the vanishing ideal of X . Some of the main results are in determining the structure of $I(X)$ to compute some of its invariants. It is shown that $I(X)$ is a lattice ideal. We introduce the notion of a parameterized linear code arising from X and present algebraic methods to compute and study its dimension, length and minimum distance. If G is a connected graph, we compute its length and determine when $I(X)$ is a complete intersection. If G is a connected non-bipartite graph, we show an upper bound for the minimum distance.