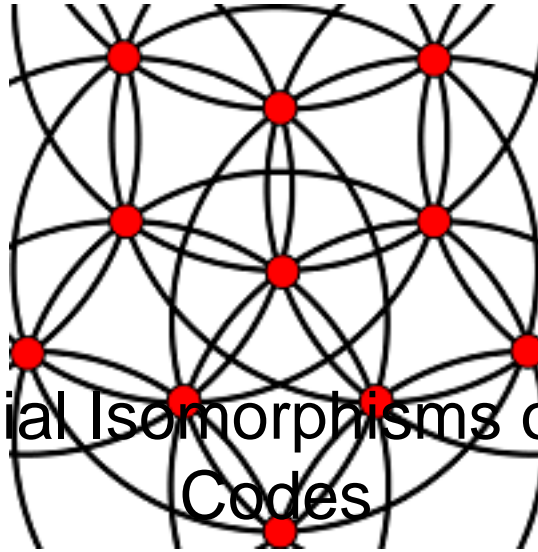


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Monomial Isomorphisms of Cyclic Codes

Content :

For cyclic codes, there are multiple notions of isomorphism. For example, we can consider isomorphisms that only permute the coordinates of codewords, or isomorphisms that not only permute the coordinates of codewords but also multiply each coordinate by a scalar (not necessarily the same scalar for each coordinate) as it permutes the codewords. Isomorphisms of cyclic codes of the first kind have been studied - we will call them permutation isomorphisms - and our purpose is to begin study of the second kind of isomorphism - which we call monomial isomorphisms. We give examples of cyclic codes that are isomorphic by monomial isomorphisms that are not isomorphic by permutation isomorphisms. We find necessary conditions to reduce the solution of when two cyclic codes are monomially isomorphic to the solution of when two cyclic codes are permutation isomorphic, and applying results in the literature, give an explicit (shortest possible) list of permutation isomorphism which must be checked to determine if two cyclic codes are monomial isomorphic for most lengths over most finite fields. Our results also hold for some codes which are not cyclic.

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