

The Ring of Additive Polynomials and Weights of Cyclic Codes

Cem Güneri

Faculty of Engineering and Natural Sciences
Sabancı University

Estimating the weights of codewords in cyclic codes is one of the classical problems of coding theory. One approach to this problem relates codeword weights to the number of solutions of certain equations over finite fields. For a large family of cyclic codes, related equations define irreducible algebraic curves. In this case, we can use the Hasse-Weil bound for the number of rational points on curves over finite fields. However, there are cyclic codes whose weight analysis requires bounds for reducible curves. We show how to obtain irreducible components of such reducible curves. The solution involves factorization of polynomials (with respect to composition operation) in the ring of additive polynomials. This enables us to write general bounds for the weights of any cyclic code.

These results have been obtained in collaboration with F. Özbudak.