ODTU-Bilkent Algebraic Geometry

Grobner Bases and Linear Codes on Weighted Projective Planes

By

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Abstract: Let F be the finite field with q elements and K be its algebraic closure. The ring $S=F[x_0,x_1,x_2]$ is graded via $\deg(x_i)=w_i$, for $i=0,1,2$, where w_0, w_1 and w_2 generate a numerical semigroup! We study some linear codes obtained from the weighted projective plane $P(w_0,w_1,w_2)$ over K.

We get a linear code by evaluating homogeneous polynomials of degree d at the subset $Y\{ P_1,...,P_N\}$ of F-rational points, which defines the evaluation map: $f \mapsto (f(P_1),...f(P_N))$. The image is a subspace of F^N, which is called a weighted projective Reed-Muller (WPRM) code. Its length is $|Y|=N=q^2+q+1$. In the present talk, we discuss how Grobner theory is used for studying the other two parameters: the dimension and the minimum distance extending and generalizing the results scattered throughout the literature. We also determine the regularity set which helps eliminating the trivial codes as well as giving a lower bound for the minimum distance.

This is a joint work with Yağmur Çakıroğlu (Hacettepe University) and Jade Nardi (Université de Rennes 1).

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Place: Zoom

This is an online seminar. To request the Zoom link, please send a message to sertoz@bilkent.edu.tr