Toric surface codes and Minkowski sums

Abstract

Toric codes are evaluation codes obtained from an integral convex polytope $P$ in $\mathbb{R}^n$ and finite field $F_q$. They are, in a sense, a natural extension of Reed-Solomon codes, and have been studied recently by J. Hansen and D. Joyner.

In this seminar, we show upper and lower bounds on the minimum distance of a toric code constructed from a polygon $P$ in $\mathbb{R}^2$, provided by J. Little and H. Schenck in 2005, by examining Minkowski sum decompositions of subpolygons of $P$.

A brief introduction to Coding Theory will be provided too.

Key words: Coding Theory, Toric Geometry, Toric codes, Minkowski sum.