Triply even codes obtained from some graphs and finite geometries

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This is joint work with Koichi Betsumiya

A triply even code is a binary linear code in which the weight of every codeword is divisible by 8. By Lam and Yamauchi [3], every triply even code of length a multiple of 16 containing the all-ones vector is the structure code of some holomorphic framed vertex operator algebra. Motivated by this fact, we classified maximal triply even codes of length 48, and discovered an infinite family can be obtained from the triangular graphs [1].

In this talk, we present another infinite family of triply even codes, derived from the odd-orthogonal graphs [2, Section 12.2]. Let V be a 4-dimensional vector space over a finite field of odd characteristic, equipped with a nondegenerate quadratic form of Witt index 1. Define a graph Γ whose vertex set is the set of nonisotropic projective points of plus type, where two vertices are adjacent whenever the line through these points is a tangent. Then the row vectors of the adjacency matrix of Γ generate a triply even code of length $q(q^2+1)/2$.

The proof of this fact amounts to showing that the number of common neighbors of three distinct vertices is always even.

References

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