

Recent results and open problems on unitals

A *unital* is defined to be a set of $q^3 + 1$ points equipped with a family of subsets, each of size $q + 1$, such that every pair of distinct points are contained in exactly one subset of the family. Such subsets are usually called *blocks* so that unitals are block-designs $2 - (q^3 + 1, q + 1, 1)$. Unitals are known to play an important role in many investigations in finite geometry.

Computer aided searches suggest that there should be plenty of unitals, especially for small values of prime powers q , but those embeddable in a projective plane are quite rare.

Here a unital is *embedded* in a projective plane Π of order q^2 if its points and blocks are points and lines of Π .

Summary

We address the following topics

Recent results regarding the uniqueness of embedding of the classical and Buekenhout-Metz unitals in the Desarguesian plane of order q^2 .

Automorphism groups of unitals containing translations, and a related open problem in Graph theory.

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