

UNIVERSITY OF DELAWARE
DEPARTMENT OF MATHEMATICAL SCIENCES
DISCRETE MATHEMATICS SEMINAR

Friday Mar. 7, 2003, 3:45pm, Room 436 Ewing Hall

On Mathon's Construction of Maximal Arcs in $\text{PG}(2, 2^m)$

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Let $\text{PG}(2, 2^m)$ be the Desarguesian plane of order 2^m . A set \mathcal{K} of k points in $\text{PG}(2, 2^m)$ is called a (k, n) -arc if no $n + 1$ points of this set are collinear. The number n is called the *degree* of the arc \mathcal{K} .

In 1969, Denniston [D '69] gave a construction for maximal arcs of degrees 2^d for all $0 \leq d \leq m$. Mathon generalized this construction in his article [M '02]. He obtains maximal arcs as union of disjoint conics that are parametrized by an additive subgroup A of the field \mathbb{F}_{2^m} and polynomials $p : A \rightarrow \mathbb{F}_{2^m}$, $q : A \rightarrow \mathbb{F}_{2^m}$ that have certain properties. If the degrees of both p and q are at most 2 then the arcs are Denniston maximal arcs.

A question Mathon raised was what the largest degree of these maximal arcs is if they are not obtained by Denniston's construction. We show that the largest degree for $\{p, 1\}$ -maps is $2^{\lfloor \frac{m+2}{2} \rfloor}$. For $\{p, q\}$ -maps the upper bound is $2^{\lfloor \frac{m+4}{2} \rfloor}$.

This is joint work with K.H. Leung, National University of Singapore, and Q. Xiang, University of Delaware.

References

- [D '69] R.H.F. Denniston. Some maximal arcs in finite projective planes. *J. Comb. Theory*, **6** (1969), 317–319.
- [M '02] R. Mathon. New maximal arcs in Desarguesian planes. *J. Comb. Theory (A)* **97** (2002), 353–368.