A full classification of the complete k-arcs of PG$(2, 23)$ and PG$(2, 25)$

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Abstract

A full classification (upto equivalence) of all complete k-arcs in the Desarguesian projective planes of order 23 and 25 was obtained by computer.

The algorithm used is an application of isomorph-free backtracking using canonical augmentation, as introduced by B. McKay, which we have adapted to the case of subset generation in Desarguesian projective planes. We have applied two variants of the same algorithm, and both techniques yield exactly the same results. Earlier (partial) results by other authors on k-arcs in PG$(2, q)$ with $q \leq 25$, are reproduced by our programs.

We describe those parts of the algorithms which are relevant to the particular problem of generating k-arcs and which have made this project feasible. We also list the number of complete arcs in PG$(2, 23)$ and PG$(2, 25)$ according to size of the arc and order of the automorphism group.