

Maximal arcs and quasi-symmetric designs

Dieter Jungnickel

University of Augsburg, Germany

In 2001, Blokhuis and Haemers gave an interesting construction for quasi-symmetric designs with parameters $2-(q^3, q^2(q-1)/2, q(q^3 - q^2 - 2)/4)$ and block intersection numbers $q^2(q-2)/4$ and $q^2(q-1)/4$ (where $q \geq 4$ is a power of 2), which uses maximal arcs in the affine plane $AG(2, q)$ and produces examples embedded into affine 3-space $AG(3, q)$. We consider this construction in more detail and in a more geometric fashion and show that it leads to exponential numbers of such designs. For instance, in the smallest case $q = 4$, one already obtains at least 28,844 isomorphism classes.

The proofs are elementary, but involve a nice mixture of arguments from Design Theory, Galois Geometry, Algebra and Coding Theory. This is joint work with Vladimir Tonchev and will appear in the memorial volume for Scott Vanstone, to be published as a special issue of *Designs, Codes and Cryptography*.