Abstract

Quasi-symmetric 2-$(28, 12, 11)$ designs with an automorphism of order 5

Renata Vlahović Kruc

Department of Mathematics, Faculty of Science, University of Zagreb, Bijenička cesta 30, HR-10000 Zagreb, Croatia

A t-(v, k, λ) design is *quasi-symmetric* if any two blocks intersect in either x or y points, for non-negative integers $x < y$. The first known quasi-symmetric 2-$(28, 12, 11)$ designs with intersection numbers $x = 4$ and $y = 6$ were constructed as derived designs of the symplectic symmetric 2-$(64, 28, 12)$ design [3]. There are four non-isomorphic SDP designs (designs with the symmetric difference property) with parameters 2-$(64, 28, 12)$. Derived designs any of them are quasi-symmetric 2-$(64, 28, 12)$ designs [2]. In [1], designs with these parameters were classified with an automorphism of order 7 without fixed points and blocks; there are exactly 246 such designs. Furthermore, in [4] the number of quasi-symmetric 2-$(28, 12, 11)$ designs was increased to 58 891.

Using a method based on tactical decompositions, we classified quasi-symmetric 2-$(28, 12, 11)$ designs with an automorphism of order 5. Up to isomorphism, there are exactly 31 696 such designs.

This is joint work with Vedran Krčadinac.

References

1. Y. Ding, S. Houghten, C. Lam, S. Smith, L. Thiel, and V. D. Tonchev, *Quasi-symmetric* 2-$(28, 12, 11)$ *designs with an automorphism of order* 7, J. Combin. Des. **6** (1998), no. 3, 213–223.
2. D. Jungnickel, V. D. Tonchev, *On symmetric and quasi-symmetric designs with the symmetric difference property and their codes*, J. Combin. Theory Ser. A **59** (1992), no. 1, 40–50.
3. W. M. Kantor, *Symplectic groups, symmetric designs, and line ovals*, J. Algebra **33** (1975), 43–58.
4. V. Krčadinac, R. Vlahović, *New quasi-symmetric designs by the Kramer-Mesner method*, Discrete Math. **339** (2016), no. 12, 2884–2890.