

Recent Results on The Classification of Flag-transitive Steiner Systems

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Abstract:

Among the properties of homogeneity of incidence structures flag-transitivity obviously is a particularly important and natural one. Consequently, in the last decades flag-transitive Steiner t -designs (i.e. flag-transitive t - $(v, k, 1)$ designs) have been investigated, whereas only by the use of the classification of the finite simple groups it has been possible in recent years to essentially characterize all flag-transitive Steiner 2-designs.

However, despite the finite simple group classification, for Steiner t -designs with parameters $t > 2$ such characterizations have remained challenging long-standing open problems.

This talk presents the complete classification of all flag-transitive Steiner t -designs with $t > 2$. The deep result, which relies on the classification of the finite doubly transitive permutation groups, generalizes work by J. Tits (1963) and H. Lüneburg (1965). The occurring examples and an outline of the proof shall be illustrated.