Abstract

On abelian distance-regular covers of complete graphs related to rank 3 permutation groups

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A distance-regular antipodal cover of the complete graph K_n is equivalently defined as a connected graph, whose vertex set admits a partition into n (antipodal) classes of the same size $r \geq 2$ such that each class induces an r-coclique, the union of any two distinct classes induces a perfect matching, and any two non-adjacent vertices that lie in distinct classes have exactly $\mu \geq 1$ common neighbours; such a graph is briefly referred to as an (n, r, μ)-cover. An (n, r, μ)-cover is called *abelian* if the group of all its automorphisms fixing (setwise) every its antipodal class is abelian and acts regularly on every antipodal class of the cover. The study of abelian (n, r, μ)-covers is motivated by their various applications, e.g. in coding theory and discrete geometry. The aim of this talk is to investigate abelian (n, r, μ)-covers Γ with the following property: *there is a vertex-transitive group of automorphisms G of Γ which induces an almost simple primitive permutation group G^Σ on the set Σ of antipodal classes of Γ*. Such covers have been classified in the case when the permutation rank $\mathrm{rk}(G^\Sigma)$ of G^Σ equals 2. We will present some recent results on classification of such covers in the case $\mathrm{rk}(G^\Sigma) = 3$.

Acknowledgement. This research was supported by the Russian Science Foundation under grant no. 20-71-00122.