Symmetric block designs of order nine admitting an automorphism of order six

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A balanced incomplete block design (BIBD) with parameters (v, b, r, k, λ) (or $2 - (v, k, \lambda)$ design) is a pair (V, B), where V is a v-set and B is a collection of b k-subsets (blocks) such that each element of V is contained in exactly r blocks and any 2-subset of V is contained in exactly λ blocks. Elements of the set V are called points.

A BIBD with $b = v$ (or equivalently, $r = k$) is a symmetric (v, k, λ) design. The number $n = k - \lambda$ is the order of the symmetric (v, k, λ) design.

Enumeration of all symmetric designs for some parameters is often a very dificult task because of very large number of possibilities. Therefore, some restrictions are needed.

In this work we presented the classification of symmetric block designs of order nine admitting an automorphism of order six.

This classification was recently completed and some further information about the constructed designs are provided. Namely, the informations about duality of constructed designs and about the structures of the full automorphism groups of these designs are also given. Some interesting groups appear.