

BLOCK INTERSECTION NUMBERS OF CERTAIN BLOCK DESIGNS

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Let $(G, +)$ be a finite group of order v , and U a fixed-point free group of automorphisms of G with order $k \geq 2$. We refer to such a pair (G, U) a Ferrero pair. If one defines *blocks* as the subsets of G of the type $Ua + b = \{u(a) + b \mid u \in U\}$ for $a, b \in G$ with $a \neq 0$, then one obtains a simple $2-(v, k, k-1)$ design with interesting combinatorial, geometrical, and statistical applications.

Important examples of finite Ferrero pairs are the *field generated* ones. Such one comes from a finite field $(F, +, \cdot)$ and a nontrivial subgroup U_k of order k of the multiplicative group of F , whose elements are viewed as automorphisms of the additive group $(F, +)$ via multiplication. In this case, we denote the 2-design obtained by $\mathcal{B}_{F,k}$, or $\mathcal{B}_{q,k}$, where $q = |F|$ is a power of some prime.

For a block design, one talks about the block intersection numbers. A positive integer r is said to be a *block intersection number* of the design if there are two blocks intersecting exactly at r points.

In this talk, we will discuss the maximal block intersection numbers for field generated 2-design $\mathcal{B}_{q,k}$ as described above.