Abstract

On some generalizations of symmetric designs

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A symmetric (v,k,λ)-design is a finite incidence structure of v elements and v blocks such that each block contains k elements, ech elements occurs on k blocks, and (*) 2 different elements occur in a common block exactly λ times.

(1) Without condition (*) we obtain a tactical configuration TC(v,k). (2) For even designs ED(v,k) condition (*) is replaced by (**) 2 different elements occur in a common block an even number of times. (3) For symmetric configurations v_k condition (*) is replaced by (***) 2 different elements occur in a common block at most once. (4) For symmetric spatial configurations $(v_k)_2$ (*) is replaced by (****) 2 different elements occur in a common block at least twice, and 2 different blocks intersect in at most 2 elements.

An orbital matrix OM(v,k,x;λ) is a matrix A of size v with non-negative integer entries and row and column sum k such that $AA^t = (k + x - \lambda)I_v + \lambda J_v$.

A weighing matrix W(n,w) of weight $w \neq 0$ and order n is a square matrix of size n with entries from $\{-1, 0, +1\}$ satisfying $WW^t = wI$.

This paper will discuss some of these discrete structures and investigate their properties.