74. *Dualizing with respect to s-tuples*

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1. Introduction. In a projective plane, if the roles of lines and points are interchanged, the dual geometry is obtained. Similar concept was introduced in a field of the design of experiments by Bose and Nair [1], who derived a new class of designs, by interchanging blocks and treatments in a given class of block designs. This concept of interchanging the roles of blocks and treatments is usually named as "DUALIZATION". We denote the dual of the design D by D_1^*. This dualization, that is, writing the block numbers of blocks in which a treatment occurs in the original design, is extended to another concept as writing the block numbers of blocks in which a pair of treatments occurs in the original design. This is named as "Dualization with respect to (w.r.t.) pairs", which is denoted by D_2^* for a given block design D, and is dealt with in Mohan and Kageyama [6]. In this note, the concept of dualization w.r.t. pairs is further generalized in the form as "Dualization w.r.t. s-tuples" for $s \geq 1$. This dual design is denoted by D_s^*. Applying this technique to certain designs yields new block designs D_s^* for some values of s. For the description of some technical terms in designs, we refer the reader to Raghavarao [7].

2. Method. We here consider an equireplicated and equiblock-sized design in which the number of treatments (with the replication number r) is v and the number of blocks (of size k) is b. The present method is as follows: Number the blocks of a given block design D. Now in D_s^* if the i-th block of D includes an s-tuple, then the corresponding block of D_s^* will have the i-th treatment of D_s^*. This D_s^* coincides with the known cases described in the introduction when $s=1$ and 2.

For a given block design D with parameters v, b, r and k, it is obvious that its dual design D_s^* w.r.t. s-tuples, for $s<k$, is characterized by the parameters in the following form:

$v'=b,\ b'=\binom{v}{s},\ r'=\binom{k}{s},$

$k'=$ the number of times s-tuples of treatments occur in the original design,

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