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ABSTRACT

Federer, W. T., Cornell University, and Zelen, M., National Cancer Institute, "Design for Two-way Elimination of Heterogeneity", 10:30 a.m. - 12:20 p.m., Sunday, December 27, 1964.

In a recent paper (Annals Math. Stat. 35:658) the authors introduced a series of new experimental designs which were constructed by taking the direct product of the row and column incidence matrices of two given designs. These designs as well as most previous designs with two-way elimination of heterogeneity have the characteristic that both the block (column) and row incidence matrices are of the form

$$NN' = h(0,0)I_1 \times I_2 + h(0,1)I_1 \times J_2 + h(1,1)J_1 \times J_2$$

where the h quantities are constants related to the design, I_s is the $m_s \times m_s$ identity matrix, J_s is the $m_s \times m_s$ matrix with all elements equal unity, and $\times$ denotes the direct (or Kronecker) product.

In the present paper experimental designs for $2 \leq v, r \leq 10$, for v = number of treatments and r = number of replicates in a k row by b column design are given for row and column incidences of the following types: RB/BIB, RB/GD, RB/MGD, BIB/BIB, BIB/GD, BIB/MGD, GD/GD, GD/MGD, and MGD/MGD, where RB = randomized complete block, BIB = balanced incomplete block, GD = group divisible, and MGD = modified group divisible. For example, a latin square design is of type RB/RB and the Youden square design is of the type RB/BIB. The estimated treatment effects (intrablock) and variances of differences between effects are obtained using the results of the previous paper (loc. cit.).

In addition, designs are developed using coefficient matrices of the type

$$N_r = N_{1r} \times \mathbf{1}_2 \times \mathbf{1}'_3$$

$$N_c = N_{1c} \times \mathbf{1}_3 \times \mathbf{1}'_2 \quad ,$$

resulting in row incidence matrix $N_r N_r'$ and column incidence matrix $N_c N_c'$ which have the characteristic described above for NN' .