

## On the Optimality of Blocked Main Effects Plans

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**Abstract :** In this article, experimental situations are considered where a main effects plan is to be used to study  $m$  two-level factors using  $n$  runs which are partitioned into  $b$  blocks, not necessarily of same size. Assuming the block sizes to be even for all blocks, for the case  $n \equiv 2 \pmod{4}$ , optimal designs are obtained with respect to type 1 and type 2 optimality criteria in the class of designs providing estimation of all main effects orthogonal to the block effects. In practice, such orthogonal estimation of main effects is often a desirable condition. In the wider class of all available  $m$  two level even sized blocked main effects plans, where the factors do not occur at high and low levels equally often in each block, E-optimal designs are also characterized. Simple construction methods based on Hadamard matrices and Kronecker product for these optimal designs are presented.

**Keywords :** design matrix, Hadamard matrix, Kronecker product, type 1 criteria, type 2 criteria

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