

Incomplete split-plot \times split-block designs generated by Kronecker type products

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Abstract

There are many experiments where number of treatment combinations is large, especially in a field research. A traditional method of a designing factorial experiments based on the ordinary Kronecker product of matrices leads to the designs having desirable statistical properties but also with large number of units. In the paper we present application of a semi-Kronecker (Khatri-Rao) product of matrices in a construction procedure of incomplete split-plot \times split-block designs for three factor experiments. With both methods the resulting designs are obtained when levels of each factor are allocated to a balanced square lattice design. To sum up the comparison of the considered construction methods we can find that the Khatri-Rao product can lead to a reduction in the number of replications. Additionally, the stratum efficiency factors with respect to some interaction contrasts increase.

Keywords

Balanced square lattice design, Efficiency, General balance, Split-plot \times split-block design, Kronecker product, Resolvability, Semi-Kronecker (Khatri-Rao) product of matrices.

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