

# Optimal block designs under multivariate linear model with additional nuisance parameters

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## Abstract

The optimality of block designs under the multivariate model with additional nuisance parameters is studied. We give the relationship between optimality of designs in the univariate model and in this multivariate extension according to known and partially unknown dispersion matrices. Such models can be used for block experiments in which interplot interference may occur. To determine optimal designs Kiefer optimality w.r.t. the estimation of parameters of interest (treatment effects) is considered. We characterize optimal designs using the information matrix for estimation of parameters of interest and the precision matrix in the maximum likelihood estimation of parameters of interest in the multivariate model with a known and a partially unknown dispersion matrix, respectively.

## Keywords

Multivariate model, Kiefer optimality, Information matrix, Precision matrix.

## References

- Kollo, T. and D. von Rosen (2005). *Advanced Multivariate Statistics with Matrices*. Dordrecht: Springer.
- Markiewicz, A. and A. Szczepańska (2007). Optimal designs for multivariate linear models. *Statist. Probab. Lett.* 77, 426–430.
- Pukelsheim, F. (1993). *Optimal Designs of Experiments*. New York: Wiley.