

Inference in linear mixed models and Jordan algebra

Roman Zmyślony

University of Zielona Góra

Abstract

This presentation will show usefulness of Jordan algebra in estimation and testing hypotheses in linear mixed models. In fact, the good properties of estimators and tests, will be explain in terms of Jordan algebras. The linear models and its inference will be explain in coordinate free approach. Namely, existence of BLUE for parametric estimable functions will be given in explicit form, and the test statistic for testing hypotheses about single parameter will be function of unbiased estimators. In the case when BLUE and BQUE exist for all parameters of fixed effects and covariance matrix, respectively, under additional assumption of normality, the estimators are BUE, because they are functions of complete sufficient statistics. Moreover, the distribution function of test statistics will be given. This idea can be applied for multivariate linear models, which will be presented in lecture given by Koziol.

Keywords

Free coordinate approach, Jordan algebra, Mixed linear models, Unbiased estimation, Testing hypotheses.

References

- Covas, R., Mexia, J. T. and Zmylony, R. (2010). Lattices in Jordan Algebra, *Linear Algebra and Its Applications* 432, 2679–2690.
- Drygas H. (1970). *The Coordinate-Free Approach to Gauss-Markov Estimation*, Berlin, Heidelberg: Springer.
- Drygas, H. , and Zmylony, R. (1992). Jordan algebras and Bayesian quadratic estimation of variance components, *Linear Algebra and Its Applications* 168, 259–275.
- Gnot, S. , Klonecki, W. and Zmylony, R. (1977). Uniformly minimum variance unbiased estimation in various classes of estimators. *Math. Operationsforsch. Statist., Ser. Statistics* 8, 199–210.
- Kruskal, W. (1968). When are Gauss-Markov and least squares estimators identical? A coordinatefree approach. *The Annals of Mathematical Statistics* 39(1), 70–75.

- Zmyślony, R. (1976). On estimation of parameters in linear models. *Applicationes Mathematicae XV 3*, 271–276.
- Zmyślony, R. (1978) A characterization of best linear unbiased estimators in the general linear model, *Lecture Notes in Statistics 2*, 365–373.
- Zmyślony, R. (1980). Completeness for a family of normal distributions, *Mathematical Statistics. Banach Center Publications 6*, 355–357.