Best Quadratic Unbiased Estimators for Variance Components in models with Orthogonal Block Structure

Francisco Carvalho[1,2], **João T. Mexia**[1], **and Roman Zmyślony**[3]

[1]*Centro de Matemática e Aplicações, Universidade Nova de Lisboa, Portugal*
[2]*Unidade Departamental de Matemática e Física, Instituto Politécnico de Tomar, Portugal*
[3] *Faculty of Mathematics, Computer Science and Econometrics, University of Zielona Góra, Poland*

Abstract

Quasi-normality is usually assumed in deriving estimators for variance components. This entails "fixing" the weight of the queues since we then assume $\mu_4 = 3(\sigma^2)^2$. This is a rather strong assumption when, as usual, we are obtaining quadratic estimators. We will overcome this restriction imposing lighter conditions on the fourth order moments and obtaining the corresponding best quadratic unbiased estimators for models with orthogonal block structures.

Keywords

Mixed models; Orthogonal block structure models; Completeness.

References

[1] Caliński, T. & Kageyama, S. (2000). *Block Designs. A Randomization Approach. Volume I: Analysis.* Lecture Notes in Statistics. Springer.

[2] Caliński, T. & Kageyama, S. (2003). *Block Designs. A Randomization Approach. Volume II: Design.* Lecture Notes in Statistics. Springer.

[3] Carvalho, Francisco; Mexia, João T.; Nunes, Célia; Santos, Carla (2015). Inference for types and structured families of Commutative Orthogonal Block Structures. *Metrika*, **78** (3), pp. 337–372.

[4] Fonseca, M.; Mexia, J. T.; Zmyślony, R. (2008). Inference in normal models with commutative orthogonal block structure. *Acta et Commentationes Universitatis Tartunesis de Mathematica* **12**, pp. 3–16.

[5] Houtman, A. M.; Speed, T. P. (1983). Balance in designed experiments with orthogonal block structure. *The Annals of Statistics* **11** (4), pp. 1069–1085.

[6] Nelder, J.A. (1965a). The Analysis of Randomized Experiments with Orthogonal Block Structure. I - Block Structure and the Null Analysis of Variance. *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences*, **283** (1393), pp. 147–162.

[7] Nelder, J.A. (1965b). The Analysis of Randomized Experiments with Orthogonal Block Structure. II - Treatment, Structure and the General Analysis of Variance. *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences*, **283** (1393), pp. 163–178.