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An algebraic study of BLUPs under two linear random-effects models with correlated covariance matrices. (English) Zbl 1358.15012

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Authors' abstract: Assume that a pair of general linear random-effects models (LRMs) is given with a correlated covariance matrix for their error terms. This paper presents an algebraic approach to the statistical analysis and inference of the two correlated LRMs using some state-of-the-art formulas in linear algebra and matrix theory. It is first shown that the best linear unbiased predictors (BLUPs) of all unknown parameters under LRMs can be determined by certain linear matrix equations, and thus the BLUPs under the two LRMs can be obtained in exact algebraic expressions. We also discuss algebraical and statistical properties of the BLUPs, as well as some additive decompositions of the BLUPs. In particular, we present necessary and sufficient conditions for the separated and simultaneous BLUPs to be equivalent. The whole work provides direct access to a very simple algebraic treatment of predictors/estimators under two LRMs with correlated covariance matrices.

Reviewer: Chen Sheng (Harbin)

MSC:

15A24 Matrix equations and identities
15A09 Theory of matrix inversion and generalized inverses
62H12 Estimation in multivariate analysis
62J05 Linear regression; mixed models
62J10 Analysis of variance and covariance (ANOVA)

Cited in **7** Documents

Keywords:

linear random-effects model; sub-sample model; covariance matrix; rank formula; linear unbiased predictors; linear matrix equations

Full Text: DOI

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