On the equivalence of estimations under a general linear model and its transformed models

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ABSTRACT

Some necessary and sufficient conditions are given for two equalities of ordinary least-squares estimators and best linear unbiased estimators of an estimable vector of parametric functions under a general linear model and its transformed linear model to hold.

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1. Introduction

Throughout this paper, \( \mathbb{R}^{m \times n} \) stands for the set of all \( m \times n \) real matrices. The symbols \( \mathbf{M}' \), \( r(\mathbf{M}) \) and \( \mathcal{R}(\mathbf{M}) \) and \( \mathcal{N}(\mathbf{M}) \) stand for the transpose, the rank, the range (column space) and the null space of a matrix \( \mathbf{M} \in \mathbb{R}^{m \times n} \), respectively. The Moore–Penrose inverse of \( \mathbf{M} \in \mathbb{R}^{m \times n} \), denoted by \( \mathbf{M}^+ \), is defined to be the unique solution \( \mathbf{G} \) to the four matrix equations

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