

D-optimal designs with correlated errors

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Abstract

This paper deals with problematic issues related to the planning of experiments. In the theory of experiments, considering the planning of experiments and, afterwards, the analysis of results and drawing of conclusions, a significant role is played by the way in which experiments are planned. This research helps to determine unknown measurements of p objects in n measurements according to the plan of the spring balance weighing design. Such experimental plans and their modifications are widely applied in different branches of knowledge, including agriculture, optics and physics. Here, issues related to the regular D-optimal spring balance weighing design are considered. These designs are considered under the assumption that the measurement errors are correlated. The upper bound of the determinant of the information matrix of estimators is given, and the conditions for this upper bound to be attained are proved. Moreover, conditions for the existence of a regular D-optimal design are presented, as well as new construction methods, based on the set of incidence matrices of some known block designs.

Keywords

block design, D-optimality, spring balance weighing design.

References

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