Uniform Four-Level Designs From Two-level Designs: A New Look

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Abstract

Literature reviews reveal that the research on the issue of constructing efficient uniform designs has been very active in the last decade. In addition, coding theory is widely used in the context of constructing good optimal designs. The present paper explores the construction of highly efficient four-level uniform designs via two transformations: a modified Gray map code and a mapping between quaternary codes and the sequence of three binary codes. The efficiency is based on the viewpoint of uniformity measured by the centered $L_2$- and wrap-around $L_2$-discrepancies of the four-level designs’ binary images. Some theoretical results related to the lower bounds of the above uniformity measures for such designs are also considered in this study.

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