

Optimality of pairwise blocked definitive screening designs

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Abstract Definitive screening designs are a new class of three-level designs which are shown superior to the classical central composite designs in response surface methodology. They can be constructed by inserting conference matrices into their fold-over structures. How to block definitive screening designs in an optimal way is of practical importance, and lacks systematic theoretical research up to now. Pairwise blocking schemes are usually adopted which assign each pair of fold-over runs into the same block. In this paper, the optimality of such pairwise blocking schemes is thoroughly studied in theory. It is shown that under the linear model consisting of main effects, quadratic effects and block effects, pairwise blocked definitive screening designs are universally optimal for the main effects among all balanced blocking schemes. Moreover, such blocked designs are proved to have the same generalized wordlength pattern and are also shown optimal under the generalized minimum aberration criterion.

Keywords Blocking · Definitive screening design · Optimality · Generalized minimum aberration · Fold-over

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