

Comparison of designs for response surface models with random block effects

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The purpose of this article is to compare designs for response surface models with a random block effect. To assess the quality of prediction associated with a given design, the scaled prediction variance is considered as a design criterion. The proposed approach is based on using quantiles of this design criterion on concentric surfaces within the experimental region. The dependence of these quantiles on the unknown value of the ratio of two variance components, namely, the ones for the block effect and the experimental error, is depicted by plotting the so-called quantile dispersion graphs (QDGs). These plots provide a clear assessment of the quality of prediction associated with a given design. A numerical example is presented to illustrate the proposed methodology.

Keywords: design dependence problem, quantile dispersion graphs, response surface design, scaled prediction variance, second- order designs, variance components.