

# A Graphical Approach for Comparing Designs for Mixed Response Surface Models on the Basis of the Power Criterion

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The purpose of this article is to compare designs for response surface models with random block effects using the power of a statistical test as a design criterion. The proposed approach is based on using quantiles of the criterion function, namely, the power of the statistical test, or its corresponding noncentrality parameter, on concentric surfaces within a particular region of the so-called *alternative space*. The dependence of these quantiles on the unknown values of the variance components of the model is depicted by plotting the so-called *quantile dispersion graphs* (QDGs) of the criterion function. These plots provide a clear assessment of the magnitude of the power value associated with a given design. A numerical example is presented to illustrate the proposed methodology.

Keywords: alternative space, noncentrality parameter, parameter space, quantile dispersion graphs, response surface designs, second-order designs, variance components.