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Fraction of Design Space for the Assessment of the Scaled Prediction Variance of Multi-response Surface Designs

Fraction of Design Space(FDS) plot is a graphical display that uses the scaled prediction variance(SPV) measure to assess and compare the prediction capabilities of response surface designs. Its application has been vastly used in single-response surface designs as a more informative display of the distribution of SPV in an experimental region. However, many experiments in industries require measurement of multiple responses for each setting of the input variables. Often, the responses are correlated which makes it difficult to compute the prediction variance of each response function independently. Therefore, multivariate methods are used to obtain the prediction variance-covariance matrix for all the responses. Multi-response surface designs are required in modeling and optimizing such experimental processes. These designs can be assessed and compared based on their prediction capabilities to enable experimenters make appropriate design selection. In this article, FDS plots are used in assessing the prediction capabilities of multi-response surface designs. Examples are given using the central composite design and three types of extended central composite design to illustrate how FDS can be used to assess the SPV and compare multi-response surface designs.

Special/ Invited session

Classification

Both methodology and application

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