
May 4, 2022

Series 9: Response surface

1 A few manipulations with response surface designs

Routine *measure3.m* simulates an experiment with 3 factors in an experimental space with 3 dimensions defined by $x_1, x_2, x_3 \in [-1.5, 1.5]$. The objective is to determine an empirical model with the results of a set of experiments. In this purpose:

- a) Simulate experiments with 3^3 , composite, Doehlert's and Box-Behnken's designs, replicating measurements (the routine simulates a measurement uncertainty),
- b) Infer the coefficients of a quadratic model for each design and select a model according to the significant effects,
- c) Perform a canonical analysis,
- d) Compare the results in terms of accuracy and number of experiments,
- e) Select 20 random points in the domain, perform the measurement for these points and compare them to the predictions of the different models
- f) Using the *slice.m* routine, perform cross-sections of the domain to view the results of the canonical analysis of one of the models,
- g) Using the *isosurface.m* routine, create a 3D graph with several isosurfaces to visualize the results of the canonical analysis of one of the models.