Augmented desirability function for multiple responses with contaminated data

ABSTRACT

Quality engineering practitioners have great interest for using response surface method in a real situation. Recently, robust design has been widely used extensively for multiple responses in terms of the process location and process scale based on sample mean and sample variance, respectively. One of the methods that can be used to simultaneously, optimize multiple responses is by using the Augmented Approach to the Harrington's Desirability Function (AADF) technique by assigning weight to the location and scale in order to see the reflection the relative importance for both effects. In this technique, the AADF approach uses a dimensionality reduction approach that converts multiple predicted responses into a single response problem. Furthermore , for the regression fitting second-order polynomials model, the Ordinary Least Squares (OLS) method is usually used to acquire the sufficient response functions for the process location and scale based on mean and variance. Nevertheless, these existing procedures are easily influenced by outliers. As an alternative, we propose the uses of higher-order estimation techniques for robust MM-location, MM-scale estimator and MM regression estimator to overcome the weakness and shortcomings. The numerical results signify that the proposed approach is more efficient than the existing methods.