

## **Optimum Designs for Parameter Estimation in a Multi-response Mixture Experiment**

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### **Abstract**

A mixture experiment in the  $(q-1)$ -dimensional probability simplex is an experiment in which the  $q$  factors are non-negative and subject to the simplex restriction, which means the sum of all factors is equal to one. In this talk, we investigate the issue of the optimal designs for parameter estimation with the considered  $k$  responses models, consisted of the Scheffé's mixture polynomial models. Initially, we characterize the structure of candidate designs based on the complete classes of the weighted centroid designs for the considered multi-response mixture experimental models with the given covariance structure. According to the well-known equivalence theorem, we demonstrate that the obtained allocation measures at the support points are the  $D$ -optimal designs for particular multi-response mixture models. Specifically, some results of the  $D$ -optimal designs in multi-response scenarios are demonstrated to be independent of the covariance structure between the  $k$  responses, but depend on the allocation of the underlying polynomial models.

Keyword: Complete class, Design optimality, Kiefer ordering, Weighted centroid design