Optimal Three-Level Factorial Designs for Response Surface Studies

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Abstract

Three-level factorial designs have been proposed to do factor screening studies in the context of response surface models. The structures of those designs, however, had been hardly studied until recent work by Cheng and Ye (2004) using a novel mathematical approach. More specifically, they use indicator function to characterize the geometric structures of three-level factorial designs, which is intrinsic to their design properties.

My research has been focused on optimal 18-run orthogonal designs. First, we have constructed a complete catalog of geometrically non-isomorphic 18-run orthogonal arrays. Second, we studies properties of these designs on several aspects. In additional to design efficiency, we especially paid attention to model discrimination properties, which is essential for model selection studies. I will show that it is not enough to consider estimation efficiency alone. Details about the algorithm developed to construct 18-run orthogonal arrays and model discrimination criteria will be discussed in this talk.