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Constructing large OMARS designs by concatenating definitive screening designs

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Orthogonal minimally aliased response surface (OMARS) designs permit the screening of quantitative factors at three levels using an economical number of runs. In these designs, the main effects are orthogonal to each other and to the quadratic effects and two-factor interactions of the factors, and these second-order effects are never fully aliased. Complete catalogs of OMARS designs with up to seven factors have been obtained using an enumeration algorithm. However, the algorithm is computationally demanding for constructing good OMARS designs with many factors and runs. To overcome this issue, we propose a construction method for large OMARS designs that concatenates two definitive screening designs. The method ensures the core properties of an OMARS design and improves the good statistical features of its parent designs. The concatenation employs an algorithm that minimizes the aliasing among the second-order effects using foldover techniques and column permutations for one of the parent designs. We study the statistical properties of the new OMARS designs and compare them to alternative designs in the literature. Our method increases the collection of OMARS designs for practical applications.

Type of presentation

Talk

Classification

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