Uniform fractional factorial designs

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The minimum aberration criterion has been frequently used in the selection of fractional factorial designs with nominal factors. For designs with quantitative factors, however, level permutation of factors could alter their geometrical structures and statistical properties. In this paper uniformity is used to further distinguish fractional factorial designs, besides the minimum aberration criterion. We show that minimum aberration designs have low discrepancies on average. An efficient method for constructing uniform minimum aberration designs is proposed and optimal designs with 27 and 81 runs are obtained for practical use. These designs have good uniformity and are effective for studying quantitative factors.

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