



# Search for minimum aberration designs with uniformity

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## Abstract

Uniform designs have been widely applied in engineering and sciences' innovation. When a lot of quantitative factors are investigated with as few runs as possible, a supersaturated uniform design with good overall and projection uniformity is needed. By combining combinatorial methods and stochastic algorithms, such uniform designs with flexible numbers of columns are constructed in this article under the wrap-around  $L_2$ -discrepancy. Compared with the existing designs, the new designs and their two-dimensional projections not only have less aberration, but also have lower discrepancy. Furthermore, some novel theoretical results on the minimum-aberration, uniform and uniform projection designs are obtained.

**Keywords** Discrepancy · Projection · Stochastic algorithm · Uniform design

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