# Efficient Design of Large Sliced Latin Hypercube Samples

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The finite element method is widely used for engineering-motivated applications and allows for extensive parameter studies of complex problems. Therefore, sample designs for FEM simulations need to be suitable for a large sample size and a high-dimensional, possibly mixed parameter space with continuous and categorical parameters. Latin Hypercube Designs are often applied for FEM simulations. However, they do not consider categorical parameters.

To construct sample designs that combine the characteristics of Latin Hypercube Designs with categorical parameters and a uniform distribution of sample points, Ba *et al.* published the OSLHD algorithm [1]. A random starting solution is iteratively optimized regarding uniform distribution of sample points. For large samples in high-dimensional parameter spaces, the number of potential starting solutions is huge. This may result in bad convergence towards the optimal solution.

We compose optimized samples of smaller size to obtain a good starting solution for large samples. Subsequently, we analyze and compare both strategies regarding the quality of their starting solution and final solution and their convergence characteristics. We also compare different composition techniques in order to reduce the restrictions accompanying this approach.

## References

[1] S. Ba, W. R. Myers and W. A. Brenneman, Optimal Sliced Latin Hypercube Designs, *Technometrics* **57** (2015), pp. 479–487.