Bi-directional Sliced Latin Hypercube Designs

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Abstract: We propose a new type of design called bi-directional sliced Latin hypercube design (BSLHD) for computer experiments. The proposed design is a special Latin hypercube design (LHD) that simultaneously accommodates two slicing structures. It consists of multiple LHDs of smaller sizes, which can be joined in two alternative ways to form two different sets of standard sliced LHDs. These new structures are useful for computer experiments with qualitative factors, experiments running in batch mode, and ensembles of multiple computer models. Some sampling properties of the designs have been proved and illustrated through numerical examples.

Key words and phrases: Computer experiment, bi-directional slicing, experimental design, qualitative factors, sliced Latin hypercube design.