Structure of Optimal Samples in Continuous Nonlinear Experimental Design for Parameter Estimation

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Abstract: In the continuous case, Optimal Experimental Design (OED) deals with designs that are described by probability distributions or samples over the experimental domain. An optimal design may correspond to a distribution having finite or infinite support or being continuous. In this paper, the structure of optimal samples for experimental designs is elucidated. It is shown that any design is in fact equivalent to a design with a finite number of support points. The lower bound and upper bound of this number, especially for optimal designs, are given and examples indicate their sharpness. Moreover, we propose an algorithm to construct optimal designs which have finite support. Several applications to OED for dynamic systems with inputs are also discussed.

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