

Optimal experimental design for the quantification of model uncertainty

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We consider optimal sensor placement for inverse problems constrained by partial differential equations in which the model contains uncertainties, both in the form of a model bias and uncertainties in the model parameters. We demonstrate the link between the sensors and the stability of the inverse problem through an observability coefficient that quantifies the influence of the sensor choice on the accuracy. We present a framework for the greedy selection of sensor locations that sequentially improves this observability coefficient and thus reduces the uncertainty. We then demonstrate the links to standard optimality criteria in Bayesian optimal experimental design.