

# Parameter Identification and Optimal Experimental Design for Partial Differential Equations

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**Abstract:** The solution of a parameter identification problem aims at determining parameters occurring in the physical model by means of measurements which are usually subject to random errors. The variances of parameter estimates and prediction depend upon the experimental design. A poorly designed experiment may result in unnecessarily large variances and imprecise predictions leading to a waste of resources. Our goal is to propose a numerical method leading sequentially to an optimal design of experiments assuming partial differential equations for the state equations involved in the parameter identification problem. We consider different formulations of this problem which take into account the statistical properties of the random error of the measurement and analyze their impact on the solution process. A numerical method which allows to consider stationary and time dependent problem is presented. Numerical experiments in the context of reactive flows including detailed chemistry are presented.

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