PhD Proposal
Stochastic methods for numerical optimization with PDE constraints

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We will consider optimization problems in an infinite dimensional setting. The objective is expressed as a function of the state, which depends on the optimization variable. The state is solution of an elliptic or parabolic linear partial differential equation with random coefficients. The idea of this work is to treat this equation as an almost sure constraint.

The primary objective of this PhD proposal is to study stochastic algorithms for these optimization problems with constraints, first using methods of stochastic gradient type. We will be mainly interested in the rigorous analysis of properties and convergence of these methods, and in estimating their rates of convergence. Moreover, we will study the implementation and the application of the considered methods, for instance for shape optimization problems.

One of the difficulties in the analysis and the construction of those stochastic algorithms will be the infinite dimensional setting. The book [1] provides a state of the art presentation in the deterministic framework. The interest for the stochastic setting and methods is currently growing, see for instance the recent articles [2, 3].

The candidate is required to have skills in numerical analysis, in optimization and in probability theory.

References


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