

Optimization with PDEs: Theory, Numerical Methods and Applications

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Optimization problems governed by partial differential equations arise in many science and engineering applications. In this compact course we will give a practice-oriented introduction to this field. The course will mainly cover the following topics:

- Existence of solutions to PDE constrained optimization problems
- Optimality conditions
- First and second order optimization algorithms
- Treatment of inequality constraints
- Discretization of PDE constrained optimization problems
- Numerical methods for discretized problems

These topics will be illustrated by theoretical and numerical examples of optimization problems governed by elliptic and parabolic PDEs.