

## 14th Simon Stevin Lecture on Optimization in Engineering

# Numerical Solution of PDE Constrained Optimization Problems

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**Tuesday, March 2, 2010, 17:00 – 18:00**

**Auditorium of the Arenberg Castle**

**Kasteelpark Arenberg 1, 3001 Leuven – Heverlee**

### **Abstract**

Optimization problems governed by partial differential equations (PDEs) arise in many science and engineering applications in the form of parameter identification problems, optimal design problems, or optimal control problems. Ultimately the numerical solution of these problems leads to large scale nonlinear programming problems (NLPs) in which the objective function or some of the constraint functions depend on the discretized PDE. However, for the reliable and efficient solution of PDE constrained optimization problems it is not enough to couple PDE discretizations with large scale NLP solvers. Instead, it is important to carefully integrate the analysis of the infinite dimensional optimization problems, the PDE discretization, and the optimization algorithms. In this talk I will present some PDE constrained optimization applications and discuss their numerical solution. I will emphasize the differences between the numerical solution of a single PDE and the PDE constrained optimization problem.

### **Biographical Information**

Matthias Heinkenschloss is Professor at the Department of Computational and Applied Mathematics at Rice University. He obtained the diploma and PhD from the University of Trier. He currently is Associate Editor of “Systems & Control Letters”, Associate Editor of “Mathematical Programming, Series A” and Member of the Editorial Board of “Numerical Linear Algebra with Applications”.

The research interests of Dr. Heinkenschloss are in optimization, optimal control and parameter identification, partial differential equations, model reduction and the application of optimization in science and engineering.

## About the Lecture Series

The “Simon Stevin Lecture on Optimization in Engineering” is set up in order to promote optimization in engineering. For this aim, every quarter of the year an outstanding international scholar is invited to report on latest progress in the development of optimization algorithms and their applications in engineering.

Simon Stevin (1548-1620) was a Flemish mathematician and engineer. Among other, he helped to advance the use of decimal fractions, was the first to explain the tides by the attraction of the moon, and discovered the hydrostatic paradox. He made numerous inventions, among them a wind propelled carriage with sails, the “land-yacht”, which once impressed Prince Maurice of Orange as it moved faster than horses, in around 1600 on the beach between Scheveningen and Petten. Simon Stevin was fond of promoting the use of science in daily life and in craftsmanship, and translated various mathematical terms into dutch. Among other, he introduced the dutch word for mathematics, "wiskunde".

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Visit the OPTEC website at <http://homes.esat.kuleuven.be/~optec/> for more details and for information about upcoming events.

**Directly after this Simon Stevin Lecture, a little reception will be given at 18:00 in the salons of Arenberg Castle, to which all attendants of the lecture are most warmly welcome!**

This Stevin lecture is co-sponsored by ICCoS (Identification and Control of Complex Systems), a Scientific Research Network of the Research Foundation - Flanders (FWO-Vlaanderen).

