Department of Numerical Analysis and Scientific Computing

Simula Research Laboratory

Oslo, Norway

Optimization in Oslo
A Seminar Series on Continuous Optimization

Date:
Wednesday May 24, 2023 at 14:00 (GMT+2, CET, UTC+2)

Speaker:
Prof. Harbir Antil
George Mason University

Title:
Optimization, Digital Twins and Augmented Lagrangian Methods

Abstract:
This talk begins by discussing the role of PDE-constrained optimization in the development of digital twins. In particular, applications to identify weaknesses in structures and aneurysms are considered. Next, we analyze a data-driven optimization problem constrained by Darcy's law to design a permeability that achieves uniform flow properties despite having nonuniform geometries. We establish well-posedness of the problem, as well as differentiability, which enables the use of rapidly converging, derivate-based optimization methods.

The second part of the talk will focus on ALESQP, which is a general purpose augmented Lagrangian based optimization algorithm that can handle generic constraints such as PDEs. Extensions of ALESQP to risk-averse optimization problems will also be considered. The talk will end with a few realistic interdisciplinary applications.

Brief Bio:

Harbir Antil is the Director of the Center for Mathematics and Artificial Intelligence and a Professor of Mathematics at George Mason University. His areas of interest include optimization, calculus of variations, partial differential equations, numerical analysis, and scientific machine learning.

He received his Ph.D. from University of Houston and spent time as a postdoc at Rice University and University of Maryland, College Park.

He is a member of Intelligence Science and Technology Experts group at National Academy of Sciences. He is also the President of the SIAM Washington DC - Baltimore Section. He is on the editorial board of journals such SIAM Reviews, SIAM J. of Sci. Comp., Journal of Optimization Theory and Applications (JOTA), and he is the Editor-in-Chief of Advances in Continuous and Discrete Models.

For more information, see: https://math.gmu.edu/~hantil/