

Lothar Collatz Seminar Summer Semester 2020

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Aerodynamic Shape Optimization

Abstract:

The problem of finding optimal shape design is of great practical importance in many engineering applications such as ship components, aircraft wings, and turbines. In the present talk, we consider the shape optimization problem of a solid body in an incompressible stationary Navier-Stokes flow.

We strive to find the optimal shape of the obstacle immersed in the fluid flow with respect to some measurement of interest, e.g. drag. The shape optimization problem is formulated on a fixed reference domain via the method of mappings. Hence, the optimization is conducted for the sequence of problems starting from the reference configuration which does not involve explicit mesh deformation. We further investigate extension operators to achieve high mesh quality for large deformations.

Following the optimize-then-discretize approach, we proceed with the derivation of the optimality system. Moreover, since the adopted approach tends to be computationally heavy we decouple the nonlinear system using fixed-point iteration technique. Finally, we present some numerical results obtained using the Firedrake software.

For further information please contact

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www.c3s.uni-hamburg.de/news-events/seminar-c3s.html