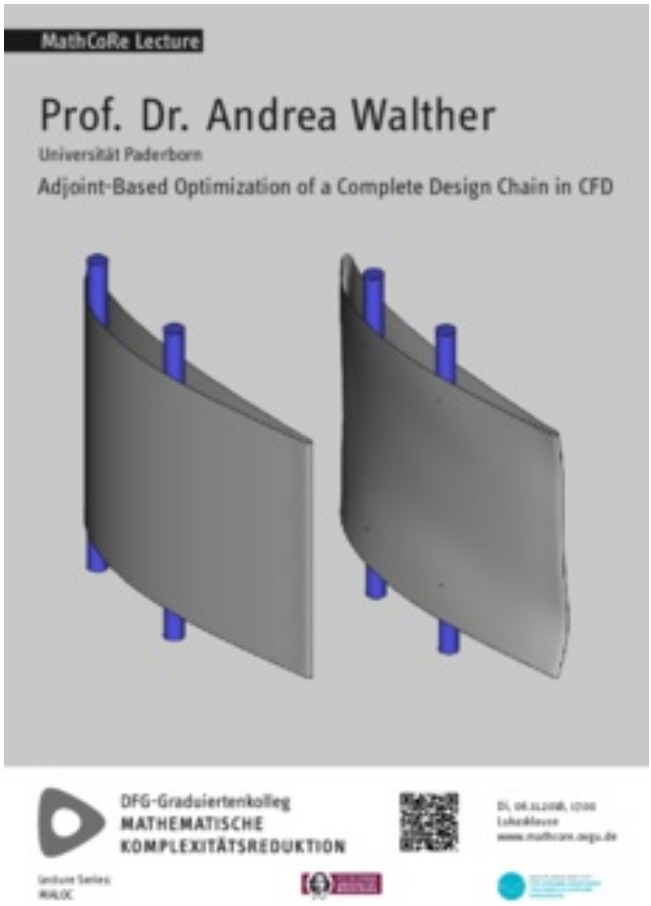
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

MAGDEBURG LECTURES ON OPTIMIZATION AND CONTROL

MathCoRe Lecture



15.10.2018 - **Adjoint-based optimization of a complete design chain in CFD**

› Prof. Dr. Andrea Walther (https://math.uni-paderborn.de/ag/mathematik-und-ihre-anwendungen/mitglieder-der-arbeitsgruppe/prof-dr-andrea-walther/) Institut für Mathematik
Universität Paderborn

Time & Place

The presentation on November 6, 2018 will be given in the Lukasklause ›(Schleinufer 1, 39104 Magdeburg) (http://ifatwww.et.uni-magdeburg.de/syst/maloc/seminars/Standort%20Lukas%20Klause.pdf) and starts at 5.00 p.m..

Abstract

The complete design chain in Computational Fluid Dynamics (CFD) covers the parameterization of the object to be optimized like, e.g., an air foil, the usage of a Computer Aided Design (CAD) tool to actually construct the air foil and a flow solver to compute the flow around the air foil. The optimization of such a complete design chain that includes a CAD tool is still a severe challenge. In this talk we present the technique of algorithmic differentiation (AD) to compute exact derivative information for a given simulation code. We discuss how AD can be applied to the CAD kernel within OpenCASCADE Technology and a suitable flow solver taking also the complexity of the derivative information into account. We will see that a gradient-based optimization using adjoint information is the only tractable way. First numerical results for the optimization of a U-bend pipe used frequently as a cooling channel and of the TU Berlin stator as one example from turbo machinery are shown. This includes also a verification of the computed derivatives.