Kolloquium Angewandte Mathematik
Prof. Thomas Apel (BAU1)
Prof. Matthias Gerdts (LRT1)
Prof. Markus Klein (LRT1)

Universität der Bundeswehr München

Vortragsankündigung

Am **Donnerstag, den 10.02.2025,** halten **um 15:00 Uhr**

Enrico Bertolazzi, Francesco Biral
(Università di Trento)

sowie

Sebastiano Taddei, Francesco Biral
(Università di Trento)

Vorträge über die Themen

Mixing direct/indirect approaches for numerical solution of optimal control problems

und

An Autonomous Driving Framework for Racing and Training

Die Vorträge finden im **Raum 3231** in **Gebäude 33** statt.

Vortragszusammenfassungen

In this presentation, we propose an approach to unify direct and indirect methods through a simple algebraic transformation of the DIRECT/INDIRECT diagram. This allows numerical techniques to be transferred between the two methods, leveraging the advantages of both. For example, proximal techniques used for minimization can improve the conditioning of the Jacobians in the indirect method. Similarly, solving controls using Pontryagin's principle can be employed to handle subproblems within the minimization process in the direct method. This perspective paves the way for the development of new numerical strategies for solving optimization problems.

In this talk, I will introduce the Artificial Race Driver (ARD) framework, a modular system for fully autonomous racing. ARD leverages Model Predictive Control and Physics-Informed Neural Networks to learn vehicle dynamics and performance characteristics, enabling it to navigate race tracks at the limits of handling. Beyond full autonomy, I will present its latest extension, the Artificial Race Trainer (ART), which utilizes ARD's capabilities to help human drivers refine their techniques and improve lap times.

Alle Interessierten sind dazu herzlich eingeladen.