Kolloquium Angewandte Mathematik
Prof. Thomas Apel (BAU1)
Prof. Matthias Gerdts (LRT1)
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der Bundeswehr Universität München

Vortragsankündigung

Am **Freitag, den 20.01.2017,** halten **um 14:00 Uhr**

Robert Baier und Wolfgang Riedl
(U Bayreuth)

einen Gastvortrag über das Thema

Adaptive Calculation of Reachable Sets by Distance Functions, OCP Solvers and Subdivision

Der Vortrag findet im **Raum 1401** in **Gebäude 33** statt.

Vortragszusammenfassung

Several applications require not only the knowledge of one optimal trajectory but the knowledge of the behaviour of all trajectories and a good approximation of all end points of feasible trajectories at a given end time forming the reachable set. Reachable sets of nonlinear state-constrained control problems with bounded controls can be calculated by various approaches, e.g., by solving partial differential equations and level set approaches, by iterative set-valued Runge-Kutta methods based on boxes in state-space or by overestimating methods.

This talk suggests an adaptive method based on optimization solvers. By solving a series of parametric optimal control problems with a varying objective function, suitable OCP solver like OCPID-DAE1, WORHP or Ipopt can be applied for the original set-valued problem. In this approach, the feasible set equals the reachable set of the control problem and the optimal value involves the distance function of a varying grid point to the (yet unknown) reachable set.

Applying a subdivision technique to this method yields rather simple convergence proofs, a refining overestimation of the reachable set by collection of boxes and an adaptive implementation that outperforms the algorithm if applied only with a regular state space discretization. As applications lower-dimensional projected reachable sets of a robot model and a single-track model for collision avoidance with more than three states and two controls are computed. Features and possible speedups of the algorithm by parallelization are also demonstrated.

Alle Interessierten sind dazu herzlich eingeladen.