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Friedrich-Alexander-Universität  
Erlangen-Nürnberg



## Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Dienstag, **04.12.2012, 14:00 Uhr**, Konrad-Zuse-Str. 3-5, Raum 2.030

### Using Discrete Mechanics and Reference Point Techniques to Solve Multiobjective Optimal Control Problems in Space Mission Design and Optimal Control Multi-Body Dynamics

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Many different numerical methods have been developed to approximate trajectories of optimal control problems on the one hand and Pareto sets of multiobjective optimization problems on the other hand. However, so far only few approaches for the numerical treatment of the combination of both problems exist leading to multiobjective optimal control problems.

This talk consists of two parts. In the first part we combine the optimal control method Discrete Mechanics and Optimal Control (DMOC) with reference point techniques to compute Pareto optimal control solutions. The presented approach is verified by determining a multiobjective optimal transfer for a space mission. Due to the approximation of the Pareto set, structurally different kind of mission trajectories can be detected which would not have been found by local single-objective optimal control methods and provide important information for a mission designer.

In the second part we extend DMOC with a discrete null space method. The resulting approach (DMOCC) is used for the optimal control of a constrained multi-body system, a 4-body kinematic chain performing a rest to rest maneuver. Initial guesses are provided by an approximation of the feasible set and again a reference point technique is used to gain various Pareto optimal trajectories.

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