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## Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Dienstag, **24.07.2018, 10:00 Uhr**, Immerwahrstr. 1, Raum 01.025

### Optimal Control based on the Adjoint Method for Multibody Systems including ANCF for Flexible Bodies

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Optimal control problems of multibody systems are often defined for mechanical systems, as e.g. industrial robots, in order to follow a specific trajectory or to increase the overall performance. Modern robot design will include promising lightweight techniques in order to reduce mass and energy consumptions in production lines. Therefore, optimal control problems have to be defined for flexible multibody systems in which the flexible components have to be able to describe moderate or large deformations during dynamic analysis. Here, the absolute nodal coordinate formulation (ANCF), which has been developed particularly for solving large deformation problems in multibody dynamics, could be utilized. The equations of motion of the constrained flexible multibody system can be expressed as a system of differential algebraic equations including the nonlinear elastic force terms in the ANCF.

In general, the optimal control problem could be defined as an optimization task described by minimizing a cost function. The gradient of this cost function can be computed very efficiently also in complex multibody systems when incorporating the adjoint method. Due to the fact that the ANCF includes a constant mass matrix with vanishing derivative, the adjoint equations reduce to a simpler form.

Summarizing, the present work proposes an approach based on the adjoint method to solve such an optimal control problem of a flexible multibody system including components which are able to perform large rotations and large deformations.

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