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Mechanik-Seminar

Referentin: **MSc María Dolores Gutiérrez**
Institute for Automobile Research (INSIA),
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Datum: Donnerstag, 20. Juni 2013
Uhrzeit: 15:45-17:15 Uhr
Ort: 10.23 SR I R 104

Vortragstitel: **Multibody Dynamics with Redundant Constraints and Singular Mass Matrix: Theory and Practice**

Abstract:

This seminar addresses the problem of determining the precise conditions for existence and uniqueness of solutions for the accelerations and constraint forces in constrained multibody systems. It focuses on three of the most important formulations for determining the equations of motion: the Lagrange Equations of the First Kind, the null space method and the Maggi's equations. In all cases, singular inertia matrices and redundant constraint equations are considered. The three aforesaid dynamic formulations lead to the same mathematical condition of existence and uniqueness of solutions, which has at the same time a clear physical meaning. The general conclusion is that the differential equations of motion of a multibody system are a well-conditioned mathematical problem and have a solution when the physical problem is also well-conditioned, that is, when all possible motions involve positive kinetic energy. This seminar also addresses the problem of determining the constraint forces when there are redundant constraints. In order to find useful and meaningful solutions when the constraint forces are undetermined, a simple method based on the weighted minimum norm solution is presented. This method is applied to several examples and its results are compared to those that are obtained by considering flexibility.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Peter Betsch