

Einladung zum Gastvortrag

im Rahmen des InnoLecture-Kolloquiums



UNIVERSITÄT
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Am Mittwoch, 21.07.2010, 14.00 Uhr, spricht
in Gebäude A5 1, Hörsaal -1.03

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zum Thema

Geometrical methods in observer design: observers and symmetries

Observers are real-time model-based estimators which allow to filter the measurement noise, and to estimate some quantities which are not directly measured. For nonlinear systems, there is no general method to design observers. In this talk, we propose to focus on a special class of nonlinear systems : systems possessing symmetries (or invariances).

For those systems we propose a general method to build candidate observers which respect the symmetries. For instance the conservation laws involved in the dynamic models of chemical reactors are independent of the choice of physical units (mol, kg, ...). Thus it seems logical that the estimation algorithms do not depend on the units either. In this case, the method allows to find all observers which are invariant to a change of units. Symmetry-preserving observers also have very interesting theoretical properties. We will apply the method to the example of multisensor fusion for mobile vehicles, in which the symmetries correspond to Galilean invariances.

The theory of symmetry-preserving observers only deals with the cases where the dimension of the symmetry group is smaller than the dimension of the state (for instance the group acts by changing a physical unit).

In the end of the talk we will mention the case where the transformation group consists of all changes of coordinates (infinite-dimensional transformation group). Indeed, we will consider conservative Lagrangian systems with configuration (position) measurements. We will present a globally convergent intrinsic velocity-observer. To do that, we will use the Jacobi metric, and we will view the Lagrangian dynamics as a geodesic flow on a manifold. This work is based on the paper by Aghannan and Rouchon (IEEE-TAC, 2003).

Alle Interessenten sind herzlich eingeladen.

Univ.-Prof. Dr.-Ing. habil. J. Rudolph



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