FAKULTÄT FÜR MATHEMATIK, INFORMATIK UND PHYSIK
UNIVERSITÄT INNSBRUCK
INSTITUT FÜR MATHEMATIK

Technikerstraße 13/7
A-6020 Innsbruck
Telefon: +43 512 507 6071 oder 6097

E-Mail: mathematik@uibk.ac.at
http://www.uibk.ac.at/mathematik/
Fax: +43 512 507 2920

MATHEMATIKKOLLOQUIUM

Das Institut für Mathematik lädt zu folgendem Vortrag ein:

M. E. Valcher (Universität Padua)

Estimation and fault detection problems for two-dimensional discrete systems

Recent years have witnessed a renewed research interest in estimation problems for two-dimensional (2D) discrete linear systems, by this meaning linear systems whose describing variables are functions of a pair of linearly independent parameters, representing either two space coordinates or a space and a time coordinate. Research efforts in this area have been conducted by resorting to two classes of models: (1) (quarter-plane causal) 2D state-space models (also known as Fornasini-Marchesini models) and (2) the behavioral approach to 2D system modelling.

The first results about observers for 2D state-space models have been obtained in the eighties, but it was only recently that a more general approach to estimation for these systems has been developed, thus leading, in particular, to the so-called "unknown input observers" (namely observers which can work even when unknown disturbances affect the system) and to a rather exhaustive analysis of fault detection techniques for 2D state-space models (a major research topic where estimation techniques are fruitfully applied).

As far as the behavioral approach is concerned, interesting results about observers have been obtained by Bisiacco, Valcher and Willems as well as by Blumthaler and Oberst, for 1D (as opposed to 2D) behaviors. When trying to extend these results to the class of linear and shift-invariant 2D behaviors, one has to face several (and somehow unexpected) difficulties, most of them related to the lack of a natural ordering of the discrete grid and hence of natural notions of past/future. A general theory is still lacking, but some results for the special class of 2D linear and shift-invariant behaviors for which the nonnegative half-plane H0:= {(h,k) : h, k integer and h+k >= 0} may be regarded as a possible future set, have been obtained.

In the talk, we will provide a brief survey of the estimation problems for the class of 2D systems described either by a state-space model or within the behavioral approach, and we will describe the state of the art in both settings, by pointing out the open problems.

Zeit: **Dienstag, den 24. März 2009 um 17:15 Uhr**
Ort: **Victor-Franz-Hess Haus, Technikerstraße 25, HS F**

Gäste sind herzlich willkommen!

Ulrich Oberst