EINLADUNG
ZUM MATHEMATISCHEN KOLLOQUIUM

Es spricht

Herr Dr. Friedrich Philipp
(KU Eichstätt)

zum Thema:

„Dynamical Sampling in Finite and Infinite Dimensions“

Abstract:

Dynamical Sampling aims to subsample solutions of linear dynamical systems at various times. In a real world scenario one might think of sensors on the ground measuring tem-perature or other quantities. Instead of installing a dense network of sensors, the idea is to use less sensors and exploit the dynamical process which the quantity is subject to. A natural mathematical model of this framework consists of considering inner products (the samples) of the form $\langle h, A^n f_i \rangle$, where h is the signal (temperature distribution etc.), $(f_i)_{i \in I}$ a system of fixed vectors, and A a linear operator which is connected with the dynamical system. The objective of the general Dynamical Sampling problem is to figure out for which operators A and which families $(f_i)_{i \in I}$ the (arbitrary) signal h can be stably recovered from the sampling data $\{\langle h, A^n f_i \rangle\}_{n,i}$.

Here, we only consider finite index sets I. We start off with the finite-dimensional situation for which we prove a characterization theorem. In the infinite-dimensional case we begin by only allowing normal operators A. Here, we prove that the operator A is necessarily a diagonal operator with eigenvalues λ_j of multiplicity at most $|I|$ in the open unit disk. Moreover, the eigenvalue sequence $(\lambda_j)_{j \in \mathbb{N}}$ must be a finite union of so-called *uniformly separated* sequences. We will complete this list of necessary conditions to a characterization of the problem and deduce some consequences.

In the case where the operator A is not assumed to be normal, so far we can only provide necessary conditions in terms of the adjoint A^*. For example, the operator A^* is necessarily strongly stable. Moreover, as in the normal case, the spectrum of A^* lies in the closed unit disk $\mathbb{D}$ and its part in $\mathbb{D}$ consists of eigenvalues of A^* with geometric multiplicities $\leq |I|$. Either these eigenvalues are discrete in $\mathbb{D}$ or they fill the disk completely. However, the latter basically only occurs when the system $(A^n f_i)_{n \in \mathbb{N},\, i \in I}$ is a Riesz basis.

The talk is based on joint work with C. Cabrelli, U. Molter, and V. Paternostro (all from Universidad de Buenos Aires).

Mittwoch, 12. Juli 2017, 17:00 Uhr, Raum C 113 im Curiebau
(Kaffee 16:30 Uhr im Raum C 325)

Alle Interessenten sind herzlich eingeladen.

Ilmenau, 15.06.2017

Die Hochschullehrer des Institutes