

Im

Oberseminar Analysis

hält

Dr. Christian Budde

University of the Free State (UFS) (Bloemfontein, South Africa), Dept. of Mathematics and Applied Mathematics

einen Vortrag zum Thema

A Lumer-Phillips type generation theorem for bi-continuous semigroups

Abstract:

The famous 1960s Lumer-Phillips Theorem states that a closed and densely defined operator $(A, D(A))$ on a Banach space X generates a strongly continuous contraction semigroup if and only if the operator is dissipative and $\mu - A$ is surjective in X for some $\mu > 0$.

Despite its great success, the theory of C_0 -semigroups of course does not apply to any evolution equation on any space. A well-known issue is that for some operators $(A, D(A))$ there is indeed a semigroup but its orbit maps fail to be continuous. A prototype example for this effect is the transport equation on the space of bounded continuous functions on the real line. Whereas the classic theory works perfectly on the subspace of uniformly continuous functions, a quite natural expansion of the space destroys the strong continuity of the shift semigroup which gives the solutions to the corresponding Cauchy problem. A natural fix for this lack of continuity is to endow the space with a coarser topology, here for example the topology of pointwise convergence or compact convergence. The latter leads to the study of strongly continuous semigroups on locally convex topological vector spaces.

Since its outset in 2001, the theory of bi-continuous semigroups has grown and by now includes a Hille-Yosida type generation theorem, an approximation theory as well as a perturbation theory including inter- and extrapolation spaces. We add another piece to the puzzle by establishing a Lumer-Phillips type generation theorem for contraction semigroups. This is in particular desirable since in the C_0 -setting the Lumer-Phillips theorem is one of the most important tools to prove that a given operator is a generator. To demonstrate the applicability of our theorem we treat the prototype example from above as well as the heat equation, where we now are able to prove the generation property without using a priori knowledge on the semigroup. The latter was not possible with the previously existing generation theorems.

This is joint work with S.-A. Wegner.

Datum: Donnerstag, 21. April 2022

Zeit: 15:15 Uhr

Der Vortrag findet über das Videokonferenzsystem „Zoom“ statt.

Ansprechpartner: Prof. Dr. Ralph Chill

Der virtuelle Raum ist über folgenden Link erreichbar:

<https://tu-dresden.zoom.us/j/89887698744?pwd=TVR3djhXNkV2U1ZFMTJ3czBOd3c4dz09>

Meeting ID: 898 8769 8744 , Passcode: @8%qq2

Alle Interessenten sind herzlich eingeladen.