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FAKULTÄT FÜR MATHEMATIK
Dekan Univ.-Prof. Dr. Christian Krattenthaler

Einladung zur öffentlichen Defensio von

David Nicolas Nenning

Thema der Dissertation:

ODE-closedness of function spaces and almost analytic extensions of ultradifferentiable functions

Abstract:
In this talk I will give a summary of the results obtained during my PhD studies. The first part is devoted to the study of so-called ODE-closed function spaces. A function space E which is continuously included in $C^1_b(\mathbb{R}^d, \mathbb{R}^d)$, the space of globally bounded continuously differentiable functions from $\mathbb{R}^d$ to $\mathbb{R}^d$ with globally bounded first derivative, is called ODE-closed, if all flows of time dependent vector fields whose spatial dependence is in E, are of the form $\mathrm{Id} + E$. Here Id denotes the identity function on $\mathbb{R}^d$. Thus when passing from a vector field of E-regularity to its flow, there is no loss of regularity involved. This notion also depends on the regularity of the time dependence. But in any case we allow vector fields that are only integrable with respect to time in some sense depending on the properties of the space E. We study a wide range of concrete function spaces and show ODE-closedness for them, among them Hölder spaces, Besov spaces and various spaces of smooth functions. We also study associated diffeomorphism groups of $\mathbb{R}^d$, consisting of flows of such time dependent vector fields, the so-called Trouvé groups (with respect to E). We identify many Trouvé groups with other diffeomorphism groups whose analytic properties are better understood. This therefore endows many Trouvé groups with additional structure, making them topological groups or even Lie groups in some instances.
The second part deals with almost analytic extension operators in the setting of Denjoy-Carleman classes. Here we characterize Denjoy-Carleman regularity of a function on some bounded subset of $\mathbb{R}^d$ via the existence of an almost analytic extension to all of $\mathbb{C}^d$. We strive for the greatest generality possible, in particular our results cover, to the best of our knowledge, all existing almost analytic extension theorems which are formulated for classes defined by weight sequences and weight functions.

Prüfungssenat:

Univ.-Prof. Dr. Josef Hofbauer(Vorsitz)
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Mag. Dr. Armin Rainer, Privatdoz.
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Prof. Dr. José Bonet
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Zeit: Donnerstag, 16. Januar 2020, 11:00 Uhr

Ort: Fakultät für Mathematik, Seminarraum 11, Oskar-Morgenstern-Platz 1