



Institut für Angewandte Analysis
Universität Ulm
89069 Ulm

ulm university universität
uulm

Prof. Dr. Wolfgang Arendt
Prof. Dr. André Schlichting
Prof. Dr. Anna Dall'Acqua
Prof. Dr. Rico Zacher

OBERSEMINAR IM INSTITUT FÜR ANGEWANDTE ANALYSIS

Wintersemester 2025/26

Im Rahmen des Oberseminars spricht am Montag, den **08. Dezember 2025**:

MAXIMILIAN ENGEL

University of Amsterdam

Dynamical Stability of Stochastic Gradient Descent in Overparameterized Neural Networks

For overparameterized optimization tasks, such as those found in modern neural networks, global minima are generally not unique. In order to understand generalization in these settings, it is vital to study to which minimum an optimization algorithm converges. The possibility of having minima that are unstable under the dynamics imposed by the optimization algorithm limits the potential minima that the algorithm on the network can find. We show how to characterize the global minima that are dynamically stable/unstable for (stochastic) gradient descent, short (S)GD. In particular, we introduce a characteristic Lyapunov exponent that depends on the local dynamics around a global minimum and rigorously prove that the sign of this Lyapunov exponent determines whether (S)GD can accumulate at the respective global minimum. This is joint work with Dennis Chemnitz (ETH).

Der Vortrag findet in **Raum E.60, Helmholtzstr. 18** statt.

Beginn: 16 Uhr (c.t.). Alle Interessierten sind herzlich eingeladen.

W. Arendt, A. Dall'Acqua, A. Schlichting, R. Zacher.