Invitation to the seminar by M. Sc. Gian-Luca Geuken for the GAMM Junior Research Group

Place: MB I - R165 (hybrid)
         Zoom Link: Link
         Meeting ID: 993 7003 5533
         Passcode: neural

Date: Tuesday, 16th December 2025
Time: 4:00 pm (16:00)

Agenda

TOP 1: Seminar by M. Sc. Gian-Luca Geuken (see abstract below)

TOP 2: Discussion and Questions

Abstract

Unraveling the Black Box: A Gentle Introduction to Neural Networks with Examples from Constitutive Modeling

Gian-Luca Geuken

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Neural networks have become powerful tools for modeling complex systems across engineering and scientific domains. Nevertheless, many practitioners still have only a vague understanding of how these models operate and therefore regard them as a "black box". This seminar-style talk provides a gentle introduction to the principles of neural network modeling with the aim of demystifying this black box. We begin with the basic concepts of neurons, activation functions, network architectures and training procedures. Key considerations such as data requirements, loss functions, model validation and typical limitations are discussed in an intuitive manner. We will also explore why neural networks are so flexible and how they achieve their universal function approximation capabilities.

The second part of the talk focuses on neural networks as constitutive models and highlights how incorporating physical knowledge or constraints can improve predictive performance and reliability.

After this seminar, you should:

- understand the basic terminology and concepts of neural networks,

- know how neural networks are trained and why they are so flexible,

- have a practical sense of possible applications and limitations of common architectures and

- no longer view them as a black box!