Bachelor/Seminar/Master Thesis

Physics-based Machine Learning

Motivation

The problem of long simulation times has a direct impact on the performance of optimization algorithms. To reduce these simulation times and also to add more features, surrogate models are used. These serve as replacement models for the high-fidelity solvers such as FEM. Physics-based machine learning can be considered as the combination of machine learning, physics and classical numerical methods. Here, the goal is to construct the surrogate models by using existing physics knowledge and by approximating classical numerical methods.

Research Questions

The focus of this work is on understanding the fundamental concepts of physics-based machine learning, implementing basic approaches, and extending them with new ideas. Since the number of possible topics is quite large, the scope of the work can be adapted for a bachelor, seminar or master thesis. Further details will be presented in a personal meeting.

Tasks

- Learning about scientific machine learning
- Implementing ideas in code
- Running experiments and tracking results

Prerequisites

- Language : German/English
- Start : As soon as possible
- Programming skills : Intermediate
- Study : ET, ICE, ET-Toningenieur

Contact/Supervisor

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