Chair for Computation in Engineering
Department of Geo, Civil and Environmental Engineering
Technical University of Munich

Modeling: ★☆☆☆☆
Mathematics: ★★★★☆
Programming: ★★★★☆
Science: ★★★★☆

Software Lab:

Learning methods in computational mechanics

Setting

Recently, learning methods have been successfully applied to mechanical simulations. This approach already good results in non-linear examples including fluid dynamics [2] and hyperelasticity [1], promising to deliver accurate results in much shorter time.

In this project you will have the possibility to understand and implement some of these methods.

Tasks

- Gain an understanding of the basic ideas of different existing approaches,
- Choose and implement one method,
- Produce some 1D examples,
- Implement and compare a second method.

Supervisors

Davide D'Angella, Simulation in Applied Mechanics Group, davide.dangella@tum.de
Stefan Kollmannsberger, Simulation in Applied Mechanics Group, kollmannsberger@bv.tum.de

References

[1] Nguyen-Thanh et al. A deep energy method for finite deformation hyperelasticity, European Journal of Mechanics - A/Solids, 2019.

[2] Raissi et al. Physics-informed neural networks: A deep learning framework for solving forward and inverse problems involving nonlinear partial differential equations, Journal of Computational Physics, Volume 378, 2019.