# A U S H A N G

# FREIE UNIVERSITÄT BERLIN
**Fachbereich Mathematik und Informatik**

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# D I S P U T A T I O N

## Mittwoch, 22. Juni 2022, 14:00 Uhr

### Ort: Raum 108/109
**(Fachbereich Mathematik und Informatik, Arnimallee 6, 14195 Berlin)**

**Disputation über die Doktorarbeit von**

## Herrn  Joscha  Podlesny

**Thema der Dissertation:**
## Multiscale Modeling and Simulation of Deformation Accumulation in Fault Networks

**Thema der Disputation:**
## Generalization error estimates for physics-informed neural networks

Die Arbeit wurde unter der Betreuung von **Prof. Dr. R. Kornhuber** durchgeführt.

**Abstract:** Solving high-dimensional partial differential equations is a frequent challenge in many application areas, e.g. the life sciences, engineering and economics. Unfortunately, established, grid-based approaches become unfeasible rapidly with increasing dimension - they suffer the curse of dimensionality.

Recently introduced physics-informed neural networks (PINN), i.e. feedforward neural networks whose loss function is formulated in terms of residuals given by the underlying PDE, have demonstrated remarkable success in approximating their solutions - even in high-dimensional settings. For this scenario, novel generalization error estimates will be presented that establish bounds in terms of the training error and number of samples. These results give first insights into why the PINN ansatz works and provide an a posteriori criterion for the accuracy of the PINN solution.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

## Interessierte werden hiermit herzlich eingeladen

Der Vorsitzende der Promotionskommission
Prof. Dr. R. Kornhuber