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ANN and data-driven approaches in material and structural mechanics

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Artificial neural networks (ANNs) and other data-driven approaches have gained significant popularity in recent years for many applications in engineering science. Of particular interest are applications related to material and structural mechanics. These include, among others, multiscale material modeling, structural optimization, inverse problems, model order reduction, real-time simulation, and structural health monitoring. For this Minisymposium, we particularly invite contributions on the following topics:

Topics of interest include, but are not limited to:

- Physics informed neural networks for structural and material modeling
- ANN applications to predict material properties, used in constitutive modeling
- Geometric learning via convolutional neural networks for computational solid mechanics
- ANN applications in fracture mechanics of solid materials, porous media mechanics
- ANNs in process design as, e.g., additive manufacturing
- Supervised/unsupervised ANN approaches in computational mechanics
- ANNs in digital twinning and structural health monitoring
- ANNs within metamaterial design, nano and microgeometry optimization, and 3D printing
- ANN application within structural dynamics and model-order reduction
- ANNs to enhance the prediction of probabilistic mechanical problems, Monte Carlo Simulations
- Characterization and reconstruction of realistic microstructures, e.g., 2D and 3D image-based methods

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