Contribution ID: **48** Type: **Oral Presentation**

Estimating permeability of real-rock micro-CT images by physics-informed neural networks

Tuesday, 31 May 2022 17:30 (15 minutes)

In recent years, convolutional neural networks (CNNs) have experienced an increasing interest for fast approximations of effective hydrodynamic parameters in porous media research. In this talk, we present a novel approach to improve permeability predictions from micro-CT scans of geological rock samples.

A well-known method to enhance the quality of CNN predictions is the supply of additional information about the input data, leading to the field of physics-informed CNNs. Most commonly for permeability predictions from rock samples, porosity and/or (specific-) surface area are made available to the CNN as auxiliary data. However, these quantities become only loosely correlated to the target permeability for complex 3D geometries posing a poor information basis for the CNN to perform predictions.

Increasing the relevance of the additional physical information provided, we supply a highly correlated graph-network-based quantity to our CNN, namely the maximum flow value. Consequently, detailed information about confined structures dominating overall fluid flow is encoded in this additional input. As a result, high prediction accuracy and robustness for permeability prediction are observed across a variety of sandstone types.

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References

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Online

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