Contribution ID: **474** Type: **Oral Presentation**

Novel maximum entropy algorithm for multiscale pore network reconstruction and extension.

Tuesday, 31 May 2022 14:20 (15 minutes)

Macroscopic porous materials properties depend on a number of porous media parameters such as porosity, connectivity, pore and throat size distributions, etc. Pore Network Models (PNM) provide a fast and convenient way to estimate those macroscopic parameters by representing a porous medium as a graph [1]. Classical Pore Network extraction methods in literature represent obtaining pore network structure directly from the three-dimensional micro-CT image of porous media. This approach works well on small-scale geometries with a fast increase of required computational power for larger scales. That is where probabilistic models of Pore Network generation are the main tool used [2]. Those methods lose some important information about restored pore space structure. The difference in internal porous media structure at the same time can drastically change macroscopic porous materials properties such as permeability tensor of a sample.
A new approach to generating complex point structures is inspired by recent advances in gradient descent methods for maximum entropy models [3]. Using this approach, we can preserve information about pore location patterns and the relative position of different pores in this pattern. Using an advanced interpore connection generation algorithm allows us to restore information about the relationship between different pore scales.
The main goal of the work is to build a fast reliable method to generate a statistical pore network. One of the main features of the proposed algorithm is the ability to increase the analyzed sample size based on statistical features of a smaller sample (pore network extension). We reconstruct samples of carbonate, sandstone, and ceramics from PNM extracted from micro-CT images and compare statistical and hydrodynamic properties for original PNM and reconstruction. Comparison of our state state-of-the-art algorithm with classical algorithms [1,4,5,6] shows a noticeable improvement in reconstruction accuracy in the number of porous media.

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Time Block Preference

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

Participation

Unsure

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