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# Multi-scale reconstruction of porous media from low-resolution core images using conditional generative adversarial networks

Thursday, 2 June 2022 11:35 (15 minutes)

Various rocks such as carbonate, coal or shale contain both micro- and macro-pores. To accurately predict the fluid flow and mechanical properties of these porous media, a multi-scale characterization of the pore space is of key importance. Hybrid superposition methods perform well in such multi-scale reconstructions, however, input images with two resolutions (high and low) and different reconstruction methods are required. In addition, the superposition algorithms are complex and human factors can introduce serious bias. Here we thus propose an effective approach based on conditional generative adversarial network (cGAN) for efficient and reliable multi-scale digital rock reconstruction based only on low-resolution core images. High-resolution core images with narrow field of view (FOV) and their corresponding large structure images were thus used to train the cGAN model. The model was validated with real sample images, and the model-generated images exhibited great agreement with the real pore structures. We also demonstrate that the cGAN model can generate images independent of the structure size. This work provides an advanced image-generating model based on deep learning, and therefore aids in better and wider pore-scale characterization and process modeling, to improve understanding of subsurface science and engineering processes.

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## Country

China

## References

## Time Block Preference

Time Block A (09:00-12:00 CET)

## Participation

Online

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**Track Classification:** (MS15) Machine Learning and Big Data in Porous Media