Contribution ID: **862** Type: **Poster Presentation**

Geometric Characterizations for the Prediction of Electrical Properties in Porous Media

Wednesday, 24 May 2023 16:10 (1h 30m)

Electrical transport properties through porous media have widespread applications in reservoir formation evaluation, groundwater management, mineral exploration, and carbon capture and storage (CCUS) monitoring. Additionally, advancements in 3D imaging and computing have enabled unprecedented visualization and analysis of these pore scale processes. However, relationships between a porous medium and its electrical properties are typically reported in terms of volume-averaged variables, such as porosity and fluid saturation. The contributions of the local geometries are not readily interpretable, making it difficult to generalize models to heterogeneous mediums and to larger scales.
Here we present a statistical study to provide insight into the local geometric descriptors of the conductive phase that best characterize electrical transport properties. The study consists of a similar workflow used in feature engineering and selection for data-driven machine learning models. The data used in this study has been published on Digital Rocks Portal and is, to our knowledge, the most extensive set of standardized, open-source simulations in heterogeneous porous media images. We further extend these geometric descriptors to be used as input features into a convolutional neural network architecture to predict the electric current field. The results of this study can improve the interpretability and training efficiency of machine learning models and help categorize porous media systems for prediction of macroscopic properties. They also provide useful insight for understanding electrical behavior through complex porous media.

Participation

In-Person

References

MDPI Energies Student Poster Award

Yes, I would like to submit this presentation into the student poster award.

Country

United States of America

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary author: CHANG, Bernard (The University of Texas at Austin)

Co-authors: Dr VICTOR, Rodolfo (Petrobras); PRODANOVIC, Masa (The University of Texas at Austin)

Presenter: CHANG, Bernard (The University of Texas at Austin)

Session Classification: Poster

Track Classification: (MS19) Elastic, electrical, and electrochemical processes and properties in porous media