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Editorial

HIGHLIGHTS FROM THE NEW ISSUE OF INTERPORE JOURNAL

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It is a pleasure to welcome you to the latest issue of the *InterPore Journal*. This issue once again brings together diverse perspectives and cutting-edge research that highlight the strength of our interdisciplinary field. I would like to sincerely thank the authors for sharing their innovative work, the reviewers for their careful assessments, and the editorial team for their tireless commitment. Your collective contributions ensure that the journal continues to grow as a trusted forum for advancing porous media science and technology.

In this new issue, I'Anson et al. (3) develop a graph neural network (GNN) to predict permeability of porous media based on representative pore networks extracted from the structures, rather than representative structure volumes. Trained against lattice Boltzmann simulations, the GNN achieved high accuracy across a wide permeability range and outperformed the Carman–Kozeny equation. It also delivered predictions several orders of magnitude faster than simulations, showing the promise of pore network-based GNNs for efficient and reliable permeability modeling, which is essential in many porous media applications.

Lander et al. (4) present a simulation-based method to assess porosity and three-dimensional internal structure of salt rubble through deposition simulations that use high-fidelity renditions of clast shapes and a broad range of clast sizes. Their analysis shows that porosity is highly sensitive to clast size distribution, shape, rearrangement, and friction, offering new insights into fluid transport in salt rubble systems.

Roustazadeh et al. (6) explore the use of machine learning, particularly the XGBoost classification algorithm, to estimate oil recovery factors (RF) from readily available reservoir data. By training and testing on multiple databases, the models achieved moderate accuracy but showed strong dependence on the characteristics of the training dataset, underscoring database sensitivity. Feature importance and Shapley Additive exPlanations (SHAP) analysis identified reserves, reservoir area, and thickness as the dominant predictors, offering insights into key drivers of RF estimation.

Lin et al. (5) introduce a tensorization-anchoring strategy to improve the efficiency of Enriched Physics-Informed Neural Networks (EPINN) for two-phase flow simulations. By integrating an adaptive tensorization mechanism and developing an anchoring strategy (An-EPINN), the method expands learning capacity while reducing computational costs, demonstrating a promising path for faster and more efficient simulations.

Han et al. (2) propose a novel framework for optimizing underground hydrogen storage (UHS), combining advanced reservoir simulations, surrogate modeling, and stochastic optimization. Their approach captures key geological and operational complexities while achieving nearly 4878-fold faster computation compared to an approach relying solely on reservoir simulation, while maintaining comparable accuracy. The framework delivers accurate, efficient, and scalable solutions, offering valuable guidance for sustainable UHS system design and management.

Elmorsy et al. (1) present a machine learning framework using transfer learning to predict the effective thermal conductivity of various porous media samples, including Berea sandstone, Bentheimer sandstone, and Ketton limestone. Leveraging pre-trained convolutional neural networks, the approach achieves high accuracy while reducing training time, computational power, and data requirements. Their study highlights the potential of transfer learning to offer a rapid and reliable tool for characterizing subsurface thermo-physical properties, supporting applications in geothermal energy, nuclear waste disposal, and underground thermal energy storage.

Notably, two of the papers in this issue, by Han et al. (2) and Lin et al. (5), are also a further two recipients of the Invited Student Paper Award, based on outstanding presentations at the InterPore2024 annual meeting last year. This award recognizes exceptional student contributions to the field, inviting nominees to submit their research for publication in InterPore Journal. The award is granted upon successful publication, ensuring that only the highest-quality work is recognized. More details about this award can be found here.

As we close this issue, I want to thank our community for their ongoing contributions and dedication. Your research, reviews, and engagement are what make the *InterPore Journal* a vibrant platform for advancing porous media science. I hope you find the papers in this issue both inspiring and thought-provoking, and I look forward to your contributions in future issues.

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REFERENCES

1. Elmorsy, M., El-Dakhakhni, W., & Zhao, B. (2025). Enhancing Effective Thermal Conductivity Predictions in Digital Porous Media Using Transfer Learning. *InterPore Journal*, 2(3), IPJ250825-7. https://doi.org/10.69631/ipj.v2i3nr75
2. Han, Z., Tariq, Z., & Yan, B. (n.d.). A novel robust optimization framework based on surrogate modeling for underground hydrogen storage in depleted natural gas reservoirs. *InterPore Journal*, 2(3), IPJ250825-6. https://doi.org/10.69631/ipj.v2i3nr69
3. I'Anson, J., Simmons, M., Stitt, H., & Gallen, R. (2025). Using Graph Neural Networks to Predict the Permeability of Porous Media. *InterPore Journal*, 2(3), IPJ250825-2. https://doi.org/10.69631/ipj.v2i3nr47
4. Lander, R., Matteo, E., Bonnell, L., Dewers , T., Mills, M., Guilkey, J., Mitchell , C., & Stormont, J. (2025). Rubble Characteristics Associated with Room Collapse at the Waste Isolation Pilot Plant: Impact of Salt Clast Shapes and Size Distributions on the Depositional Pore System. *InterPore Journal*, 2(3), IPJ250825-3. https://doi.org/10.69631/ipj.v2i3nr45
5. Lin, J., Yan, X., Zhang, K., Zhang, Z., & Yao, J. (2025). Anchored Physics-Informed Neural Network for Two-Phase Flow Simulation in Heterogeneous Porous Media. *InterPore Journal*, 2(3), IPJ250825-5. https://doi.org/10.69631/ipj.v2i3nr67
6. Roustazadeh, A., Male, F., Ghanbarian, B., Shadmand, M. B., Taslimitehrani, V., & Lake, L. W. (2025). Machine Learning-Based Estimation of Oil Recovery Factor Using XGBoost: Insights from Classification and Data-Driven Analyses. *InterPore Journal*, 2(3), IPJ250825-4. https://doi.org/10.69631/ipj.v2i3nr53