Zhao Feng

Ph.D. Candidate, Department of Geotechnical Engineering
Tongji University, Shanghai 200092, China
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Education

Tongji University — Shanghai, China
Ph.D. in Civil Engineering — *Sep. 2021 – Jun. 2026 (Expected)*

China University of Mining and Technology — Xuzhou, China
B.S. in Mining Engineering — *Sep. 2017 – Jun. 2021*

Work Experience

Research Scholar — Aug. 2025 – Present
Mechanical and Aerospace Engineering, Cornell University — *Ithaca, NY, USA*

Research Scholar — Jan. 2025 – Jul. 2025
Aerospace and Mechanical Engineering, University of Notre Dame — *South Bend, IN, USA*

Research Scholar — Sep. 2023 – Dec. 2023
Physical Science and Engineering, King Abdullah University of Science and Technology — *Thuwal, Saudi Arabia*

Visiting Student — Feb. 2019 – Jun. 2019
Mineral Resources Engineering, Technical University of Leoben — *Leoben, Austria*

Research Areas

Research interests include subsurface multiphase flow simulation, machine-learning-based and reduced-order flow modeling, data assimilation/inverse modeling, Bayesian inference, and energy system optimization, with applications to geological carbon sequestration, shale gas hydraulic fracturing, and other sustainable geo-energy systems.

Honors and Awards

- Lingjun Talent Fellowship, Tongji University, 2025
- Outstanding Undergraduate, China University of Mining and Technology, 2021
- Zhang Guangshi Scholarship, China University of Mining and Technology, 2020
- First-class Scholarship, China University of Mining and Technology, 2017 & 2019
- Chinese Government Scholarship, China Scholarship Council, 2018

Professional Activities

- **Conference talks:** AGU Annual Meeting (2025), International Carbon Capture, Utilization and Storage Conference (2024), International Geomechanics Symposium (2023)
- **Reviewers:** Geoenergy Science and Engineering, Geo-Congress, Geoshanghai International Conference, International ISRM Congress, World Tunnel Congress

Participated Projects

Rhino-Bird Open Research | *Tencent* — 2025
- Lead the research on inverse modeling of carbon sequestration using generative AI
- Co-develop a GUI tool for interactive visualization of carbon sequestration to support decision-making
- Published 1 journal paper

CarbonX Program | *Tencent* — 2024
- Lead the research on intelligent optimization of carbon sequestration
- Published 3 journal papers

Safe Carbon Sequestration in Shale Reservoirs | *Ministry of Science and Technology of China* — 2023
- Lead the research on machine learning-based surrogate modeling of carbon sequestration
- Published 1 journal paper

Publications

Journal Articles (*Peer-refereed*)

[1] **Feng, Z.**, Yan, B., Shen, X., Zhang, F., Tariq, Z., Ouyang, W., & Han, Z. (2025). A hybrid CNN-transformer surrogate model for the multi-objective robust optimization of geological carbon sequestration. *Advances in Water Resources*, 196, 104897. https://doi.org/10.1016/j.advwatres.2025.104897.

[2] **Feng, Z.**, Tariq, Z., Shen, X., Yan, B., Tang, X., & Zhang, F. (2024). An encoder-decoder ConvLSTM surrogate model for simulating geological CO2 sequestration with dynamic well controls. *Gas Science and Engineering*, 125, 205314. https://doi.org/10.1016/j.jgsce.2024.205314.

[3] Ouyang, W., **Feng, Z.**, Zhang, F., Xia, Z., & Shen, X. (2025). CO2 sequestration and mineralization in basalts: Insights from a deep learning-based surrogate model. *Engineering Geology*, 108173. https://doi.org/10.1016/j.enggeo.2025.108173.

Journal Articles (*Under Review*)

[1] **Feng, Z.**, Liu, X. Y., Parikh, M. H., Guo, J., Du, P., Yan, B., & Wang, J. X. (2025). Generative Latent Diffusion Model for Inverse Modeling and Uncertainty Analysis in Geological Carbon Sequestration. arXiv preprint arXiv:2508.16640. https://doi.org/10.48550/arXiv.2508.16640. (submitted to *Nature Communications*)

[2] **Feng, Z.**, Yan, B., Zhao, L., Shen, X., Zhao, R., Wang, W., & Zhang, F. (2025). SURGIN: SURrogate-guided Generative INversion for subsurface multiphase flow with quantified uncertainty. arXiv preprint arXiv:2509.13189. https://doi.org/10.48550/arXiv.2509.13189. (submitted to *Journal of Computational Physics*)

[3] **Feng, Z.**, Tariq, Z., Zhang, Z., Zhao, P., Zhao, R., Wang, W., ... & Zhang, F. (2025) CoSwinNet: a conditional Swin Transformer multimodal surrogate model for subsurface multiphase flow. Available at SSRN 5511581. (submitted to *Fuel*)

[4] Tariq, Z., **Feng, Z.**, Yan, B., & Hoteit, H. (2025). From Simulator to Surrogate: GANs for Spatiotemporal Modeling of CO2 Storage Dynamics in Saline Aquifers. (submitted to *Computational Geosciences*)

Conference Proceedings

[1] **Feng, Z.**, Zhang, F., Shen, X., Yan, B., & Chen, Z. (2023, October). A Data-Driven Model for the Prediction of Stimulated Reservoir Volume (SRV) Evolution During Hydraulic Fracturing. In *ISRM Congress* (pp. ISRM-15CONGRESS). ISRM.

[2] Tariq, Z., **Feng, Z.**, Hoteit, H., Abualsaud, M., He, X., AlMajid, M., ... & Yan, B. (2024, November). TransUNet: Accelerating Multiphase Flow Prediction in Geological Carbon Storage Systems. In *Abu Dhabi International Petroleum Exhibition and Conference* (p. D021S065R002). SPE. https://doi.org/10.2118/222334-MS.