

Guodong Chen

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[Personal Website](#) — [Google Scholar](#) — [ResearchGate](#)

RESEARCH INTERESTS

- Scientific machine learning: AI-driven simulation, inverse modeling, and discovery for complex physical systems
- Generative AI and deep learning for geothermal energy, CO₂ geological sequestration, and sustainable hydrocarbon systems
- Subsurface characterization, modeling, and uncertainty quantification for geothermal, CO₂ storage, and hydrocarbon systems
- Data-driven optimization and decision-making for resilient subsurface and energy systems

ACADEMIC POSITIONS

Postdoctoral Researcher

Oct. 2025 – Present

University of California, Berkeley & Lawrence Berkeley National Laboratory Berkeley, CA, USA

Project: Subsurface Multi-Physics Modelling & Scientific Foundation Model in collaboration with Fervo Energy on Geysers, Cape, and Utah FORGE (Frontier Observatory for Research in Geothermal Energy) geothermal reservoir.

Advisors: Prof. Kenichi Soga (UCB, Member of the National Academy of Engineering) & Prof. Nori Nakata (LBNL & MIT)

Postdoctoral Researcher

Apr. 2025 – Sep. 2025

Cornell University

Ithaca, NY, USA

Project: Geothermal + Greenhouse Production

Advisor: Prof. Fengqi You

Visiting Research Scholar

Mar. 2024 – Jun. 2024

Westlake University

Hangzhou, China

Host: Prof. Yaochu Jin (Member of Academia Europaea; IEEE Fellow)

EDUCATION

The University of Hong Kong

2021 – 2025

Ph.D. in Hydrogeology

Hong Kong, China

Supervisor: Prof. Jiu Jimmy Jiao

China University of Petroleum (East China)
M.Sc. in Oil and Gas Development Engineering (Full English Program)
Supervisor: Prof. Kai Zhang

2018 – 2021
Qingdao, China

China University of Petroleum (East China)
B.Eng. in Petroleum Engineering

2014 – 2018
Qingdao, China

TECHNICAL SKILLS

Artificial Intelligence & Machine Learning: Proficient in PyTorch for building deep neural networks and generative AI models (diffusion models, diffusion policy, GANs, transformers); expertise in scientific ML for physical simulation and inverse problems.

Programming Languages: Python (PyTorch, TensorFlow, NumPy), C++, MATLAB; HPC scripting via Xshell.

Energy System Simulation: Proficient with Eclipse, COMSOL, MRST, and related multi-objective and expensive optimization methods.

PUBLICATIONS

Google Scholar: 1,600+ citations | h-index: 21 | 2 Highly Cited Papers | 40+ Peer-Reviewed Publications

Manuscripts Under Review

1. **Chen, G.**, Nakata, N., Wang, Z., Bi, Z., & Nakata, R. Spatiotemporal fluid flow prediction in subsurface fractured media using diffusion models. *JGR: Solid Earth* (Under Review). [Nature Index, IF: 4.1]
2. **Chen, G.**, & You, F. (2026). Climate-resilient plant factory cultivation via diffusion policy for intelligent energy management and sustainable crop production. *Applied Energy* (Under Review after Minor Revision). [IF: 11.0]
3. **Chen, G.**, Jiao, J. J., Wang, Z., Mao, R., & Yang, T. (2026). Physics-supervised autonomous inverse fracture modelling via generative artificial intelligence. *Geophysical Research Letters* (Minor Revision). [Nature Index, IF: 4.6]
4. Li, Z., Ma, Z., Zhao, H., & **Chen, G.*** (2026). Synergistic optimization and gas channeling identification of CO₂ flooding and sequestration via an attention-enhanced two-stage evolutionary algorithm. *Chemical Engineering Journal* (Under Review).

Refereed Journal Articles

1. **Chen, G.**, & You, F. (2026). Energy-efficient greenhouse climate control with diffusion reinforcement learning. *Applied Energy*. [IF: 11.0]

2. **Chen, G.**, Jiao, J. J., Xue, X., & Wang, Z. (2026). Rank-based learning and local model based evolutionary algorithm for high-dimensional expensive multi-objective problems. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*. [IF: 8.7]
3. **Chen, G.**, Wang, Z., Liu, Q., Jiao, J. J., & Jin, Y. (2025). Expensive multi-objective optimization guided by attention enhanced generative models. *IEEE Transactions on Neural Networks and Learning Systems*. [IF: 8.9]
4. **Chen, G.**, Jiao, J. J., Wang, Z., & Dai, Q. (2025). Multi-fidelity machine learning with knowledge transfer enhances geothermal energy system design and optimization. *Advances in Geo-Energy Research*, 16(3), 244–259. [IF: 10.0]
5. **Chen, G.**, Jiao, J. J., Liu, Q., Wang, Z., & Jin, Y. (2024). Machine-learning-accelerated multi-objective design of fractured geothermal systems. *Nexus*, 1(4). [Cell Press]
6. **Chen, G.**, Jiao, J. J., Jiang, C., & Luo, X. (2024). Surrogate-assisted level-based learning evolutionary search for geothermal heat extraction optimization. *Renewable and Sustainable Energy Reviews*, 189, 113860. [IF: 16.3]
7. **Chen, G.**, Luo, X., Jiao, J. J., & Jiang, C. (2023). Fracture network characterization with deep generative model based stochastic inversion. *Energy*, 273, 127302. [IF: 9.4]
8. **Chen, G.**, Luo, X., Jiao, J. J., & Xue, X. (2022). Data-driven evolutionary algorithm for oil reservoir well-placement and control optimization. *Fuel*, 326, 125125. [IF: 7.5]
9. **Chen, G.**, Zhang, K., Xue, X., Zhang, L., Yao, C., Wang, J., & Yao, J. (2022). A radial basis function surrogate model assisted evolutionary algorithm for high-dimensional expensive optimization problems. *Applied Soft Computing*, 116, 108353. [IF: 7.2]
10. **Chen, G.**, Li, Y., Zhang, K., Xue, X., Wang, J., Luo, Q., ... & Yao, J. (2021). Efficient hierarchical surrogate-assisted differential evolution for high-dimensional expensive optimization. *Information Sciences*, 542, 228–246. [IF: 8.1]
11. **Chen, G.**, Zhang, K., Zhang, L., Xue, X., Ji, D., Yao, C., ... & Yang, Y. (2020). Global and local surrogate-model-assisted differential evolution for waterflooding production optimization. *SPE Journal*, 25(01), 105–118. [IF: 3.2]
12. **Chen, G.**, Zhang, K., Xue, X., Zhang, L., Yao, J., Sun, H., ... & Yang, Y. (2020). Surrogate-assisted evolutionary algorithm with dimensionality reduction method for water flooding production optimization. *Journal of Petroleum Science and Engineering*, 185, 106633. [IF: 5.2]

Co-authored Journal Articles (Selected)

1. Ma, Y., Li, Z.*, Liu, W., Zhao, H., & **Chen, G.*** (2025). Generalized regression neural network-assisted synergistic optimization of oil recovery, heat extraction, and carbon sequestration in deep reservoirs. *Physics of Fluids*, 37(5). [IF: 4.1]
2. Song, Y., Chen, J., Peng, H., Yu, C., **Chen, G.***, Liu, Y., Song, K., & Wang, D.* (2026). A data-driven machine learning framework for multi-objective production optimization of graded-viscosity polymer flooding. *SPE Journal* (Accepted).

3. Dai, Q., Zhang, L., Zhang, K., **Chen, G.**, Chen, Z., ... & Bai, J. (2026). Carbon-pricing optimization framework for oilfield carbon dioxide–water alternation with economic and environmental gains. *Energy Conversion and Management*, 348, 120613. [IF: 10.9]
4. Wang, Z., Chen, Y., Fu, W., Du, M., **Chen, G.**, Ma, X., & Zhang, D. (2025). Generative inverse modeling for improved geological CO₂ storage prediction via conditional diffusion models. *Applied Energy*, 395, 126071. [IF: 11.0]
5. Shi, X., **Chen, G.**, Mao, R., Luo, X., Jiao, J. J., Lu, M., ... & Kuang, X. (2025). Bioturbation and the effects on benthic flux of nitrogen in a large eutrophic lake: Insights from ²²⁴Ra/²²⁸Th disequilibrium and inverse geochemical modelling. *Geochimica et Cosmochimica Acta*. [Nature Index, IF: 4.5]
6. Wang, Z., Chen, Y., Wang, N., **Chen, G.**, & Zhang, D. (2025). Generative subsurface flow modeling with pretrained diffusion model and training-free knowledge alignment. *Geophysical Research Letters*, 52(22), e2025GL118000. [Nature Index, IF: 4.6]
7. Jiang, C., **Chen, G.**, Jiao, J. J., Wang, Z., & Dai, Q. (2025). Multi-fidelity machine learning with knowledge transfer enhances geothermal energy system design and optimization. *Advances in Geo-Energy Research*, 16(3), 244–259. [IF: 10.0]
8. Liu, Q., Jin, Y., & **Chen, G.** Optimization of an implicit acquisition function for federated Bayesian many-task optimization. *IEEE Transactions on Evolutionary Computation*. [IF: 12.0]
9. Lu, Y., Zhang, K., Xue, X., Zhang, L., **Chen, G.** & Tan, K. C. (2025). Multi-Task Surrogate-Assisted Search with Bayesian Competitive Knowledge Transfer for Expensive Optimization. *IEEE Transactions on Evolutionary Computation*. [IF: 12.0]
10. Wang, Z., Chen, Y., **Chen, G.**, & Zhang, D. (2024). Optimization of geological carbon storage operations with multimodal latent dynamic model and deep reinforcement learning. *Geoenergy Science and Engineering*, 213407.
11. Xue, X., **Chen, G.**, Zhang, K., ... (2022). A divide-and-conquer optimization paradigm for waterflooding production optimization. *Journal of Petroleum Science and Engineering*, 211, 110050. [IF: 5.2]
12. Xue, X., Zhang, K.*, Tan, K. C., Feng, L., Wang, J., **Chen, G.**, et al. (2020). Affine transformation-enhanced multifactorial optimization for heterogeneous problems. *IEEE Transactions on Cybernetics*, 1–15. [IF: 10.5]
13. Zhang, K., Wang, Z., **Chen, G.**, Zhang, L., Yang, Y., Yao, C., ... & Yao, J. (2022). Training effective deep reinforcement learning agents for real-time life-cycle production optimization. *Journal of Petroleum Science and Engineering*, 208, 109766. [IF: 5.2]
14. Wang, Z. Z., Zhang, K., **Chen, G. D.**, ... (2023). Evolutionary-assisted reinforcement learning for reservoir real-time production optimization under uncertainty. *Petroleum Science*, 20(1), 261–276. [IF: 6.0]
15. Dai, Q., Zhang, L., Wang, P., Zhang, K., **Chen, G.**, et al. (2024). Adaptive constraint-guided surrogate enhanced evolutionary algorithm for horizontal well placement optimization in oil reservoirs. *Computers & Geosciences* (Accepted). [IF: 4.2]

16. Zhao, M., Zhang, K.*, **Chen, G.**, et al. (2020). A classification-based surrogate-assisted multiobjective evolutionary algorithm for production optimization under geological uncertainty. *SPE Journal*, 25, 2450–2469.
17. Zhao, M., Zhang, K.*, **Chen, G.**, et al. (2020). A surrogate-assisted multi-objective evolutionary algorithm with dimension-reduction for production optimization. *Journal of Petroleum Science and Engineering*, 192, 107192. [IF: 5.2]
18. Zhao, X., Zhang, K.*, **Chen, G.**, et al. (2020). Surrogate-assisted differential evolution for production optimization with nonlinear state constraints. *Journal of Petroleum Science and Engineering*, 194, 107441. [IF: 5.2]
19. Cao, J., Cao, H., Zhu, Y., Wang, S., Qian, D., **Chen, G.**, ... & Huang, W. (2017). Rapid and effective removal of Cu^{2+} from aqueous solution using novel chitosan and laponite-based nanocomposite as adsorbent. *Polymers*, 9(1), 5. [IF: 4.7]

Conference Papers & Presentations

1. **Chen, G.**, & Jiao, J. J. (2024). Machine learning-enabled discovery of optimal fractured geothermal systems design. *AGU Annual Meeting 2024*. Oral Presentation.
2. **Chen, G.**, & Jiao, J. J. (2024). Accelerated generative inversion of fracture networks via diffusion models. *AGU Annual Meeting 2024*. Poster.
3. **Chen, G.**, & Jiao, J. J. (2023). Deep learning enhanced evolutionary multiobjective optimization for accelerated fractured geothermal systems design. *AGU Annual Meeting 2023*. Poster.
4. **Chen, G.**, Jiao, J. J., & Luo, X. (2023). Classifier-assisted level-based learning evolutionary search for heat extraction optimization of enhanced geothermal systems. *EGU General Assembly 2023* (No. EGU23-1819). Poster.
5. **Chen, G.**, Jiao, J. J., & Luo, X. (2023). Data-driven evolutionary optimization for heat extraction optimization of enhanced geothermal system. *7th Asia Pacific Coastal Aquifer Management Meeting (APCMM)*. Oral Presentation.
6. **Chen, G.**, Jiao, J. J., & Luo, X. (2022). Data-driven evolutionary algorithm for oil and geothermal reservoir well-placement and control optimization. *49th IAH International Congress* (No. 060301). Oral Presentation.
7. **Chen, G.**, Jiao, J. J., & Luo, X. (2022). Deep generative model based stochastic inversion for fracture network characterization. *49th IAH International Congress* (No. 100200). Oral Presentation.

PATENTS

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1. J. Yao, K. Zhang, **Chen, G.**, et al. A machine learning-based large-scale reservoir production optimization method. CN 111625922 A (Chinese Patent).
 2. K. Zhang, C. Zhong, **Chen, G.**, et al. A machine learning method for reservoir production based on parallel surrogate model. CN 111861129A (Chinese Patent).

3. K. Zhang, F. Yin, X. Xue, **Chen, G.**, et al. A multi-fidelity injection-production optimization method based on multi-scale reservoir model. CN 111861774A (Chinese Patent).
4. J. Cao, H. Cao, X. Tian, D. Qian, **Chen, G.**, et al. Method for preparing fast adsorption material with porous structure. ZL 2016 1 0830926.2 (Chinese Patent).

RESEARCH GRANTS & PROJECTS

- **Subsurface Multi-Physics Modelling & Scientific Foundation Model**, UCB & LBNL. Oct. 2025–Present. Participant.
- **ADVANCEA – Advancing Controlled Environment Agriculture Through Data-Driven Decision-Making and Workforce Development**, U.S. Department of Agriculture, \$3.77M. Participant.
- **Digital Twin-Empowered Landslide Emergency Risk Management**, Research Grants Council of Hong Kong, Theme-based Research Scheme, HK\$2.506M. Participant.
- **The Poshan Drainage Tunnel System as a Hillslope Critical Zone Observatory to Explore Groundwater Dynamics**, Research Grants Council of Hong Kong, Collaborative Research Fund, HK\$2.79M. Participant.

INVITED TALKS & CONFERENCE CONVENERS

- **Hong Kong University of Science and Technology (Guangzhou), Invited AP job talk, Thrust of Earth, Ocean, and Atmosphere** – Guangzhou, GD, China, May. 2026. Host: Prof. Shuncheng Lee.
- **Stanford University, Invited AP job talk** – Stanford, CA, USA, Sep. 2024. Host: Prof. Roland Horne & Louis Durlofsky.
- **Lawrence Berkeley National Laboratory** – Berkeley, CA, USA, Feb. 2025. Hosts: Prof. Jonny Rutqvist & Prof. Jens Birkholzer.
- **Cornell University** – Ithaca, NY, USA, Jan. 2025. Host: Prof. Fengqi You.
- **Massachusetts Institute of Technology (MIT)** – Cambridge, MA, USA, Dec. 2024. Hosts: Dr. Aimé Fournier & Prof. Laurent Demanet.
- **Advances in Geo-Energy Research (Webinar)** – Nov. 2024. Host: Dr. Jie Liu.
- **Yale University** – New Haven, CT, USA, Oct. 2024. Host: Prof. Lu Lu.
- **Stanford University** – Stanford, CA, USA, Sep. 2024. Host: Prof. Jef Caers.
- **Westlake University** – Hangzhou, China, Mar. 2024. Host: Prof. Yaochu Jin.

ORGANIZING COMMITTEE

- **7th Asia Pacific Coastal Aquifer Management Meeting (APCAMM)** – Aug. 2023. Conference Website Administrator.
- **Advances in Geo-Energy Research Forum (Session Organizer)** – Dec. 2025. Host: Guodong Chen.
- **American Geophysical Union 2026 Annual Meeting (Session Primary Convener)** – Dec. 2026. Host: Guodong Chen.

GUEST EDITORS

- **Journal of Environmental and Earth Sciences.** Lead Guest Editor.
- **Advances in Differential Equations and Control Processes.** Lead Guest Editor.

TEACHING EXPERIENCE

The University of Hong Kong, Dept. of Earth Sciences

2021–2025

Teaching Assistant & Tutorial Leader across 5 courses:

- Hydrogeology (Undergraduate)
- Soil & Rock Mechanics (Undergraduate)
- Engineering Geology (Undergraduate)
- Applied Hydrogeology (MSc)
- Geology Principles and Practice (MSc)

PEER REVIEW SERVICE

Reviewer for the following journals:

- *IEEE Transactions on Evolutionary Computation; IEEE Transactions on Cybernetics; IEEE Transactions on Artificial Intelligence; IEEE Transactions on Systems, Man and Cybernetics: Systems; Swarm and Evolutionary Computation; Information Sciences; Applied Soft Computing;*
- *Geophysical Research Letters; Water Resources Research; Journal of Hydrology*
- *Applied Energy; Energy Conversion and Management; Engineering; Journal of Energy Storage; SPE Journal; Fuel; Advances in Geo-Energy Research; Petroleum Science; Scientific Reports; Complex & Intelligent Systems*
- *Structural and Multidisciplinary Optimization; Evolutionary Intelligence; SN Applied Sciences; Mathematical Biosciences and Engineering*

HONOURS & AWARDS

Academic Honours

- HKIE Ringo Yu Prize for Best PhD Thesis
- HKU Foundation Excellent PhD Award
- Outstanding Master's Thesis of Shandong Province Graduate Students

Scholarships

- National Scholarship, China Ministry of Education (top 1%)
- National Endeavor Scholarship (twice, top 3%)
- First-Class Scholarship for Top Talents in International Classes (top 3%)
- Bank of China Scholarship (top 5%)
- Science and Technology Innovation Scholarship (top 5%)
- Innovative Entrepreneurship Practice Excellence Star Scholarship (top 5%)
- Outstanding Contribution Scholarship (top 3%)
- Academic First-Class Scholarship (twice, top 3%)

Competition Awards

- Second Prize, 15th China Postgraduate Mathematical Contest in Modeling (top 5%)
- Second Prize, American College Students Mathematical Modeling Contest (MCM, top 3%)
- Second Prize, SPE Petro-Gathering Digital Oilfield Design Contest (top 5%)
- Second Prize, Shandong University Student Science and Technology Innovation Competition (top 5%)
- Second Prize, 10th Oil Drilling and Mining Model Design Competition (top 10%)
- Second Prize, Shandong Province “Challenge Cup” Competition (top 5%)
- Silver Award, Shandong Province “Internet+” Competition (top 5%)
- Innovation and Entrepreneurship Training Program (Rated as National Level, top 5%)