

# ZIYI “FRANCIS” YIN

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Last update: July 2024

Website: [ziyiyin97.github.io](https://ziyiyin97.github.io)

Current position: Incoming Geophysicist Resident at Occidental Petroleum Corporation

## EDUCATION

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### Georgia Institute of Technology

*Doctor of Philosophy in Computational Science and Engineering*

*Master of Science in Computational Science and Engineering*

Advisor: [Felix J. Herrmann](#)

Atlanta, GA

Aug 2024

May 2023

### Emory University

*Bachelor of Science in Mathematics and Computer Science*

Advisor: [James G. Nagy](#)

Atlanta, GA

May 2019

## RESEARCH INTERESTS

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Scientific Machine Learning, High Performance Computing, Inverse Problems, Uncertainty Quantification

## WORK EXPERIENCE

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### Occidental Petroleum Corporation

*Geophysicist Resident*

Remote

Jul 2024 - Present

### Georgia Institute of Technology

*Graduate Research Assistant*

Atlanta, GA

Aug 2019 - Jun 2024

### Chevron Corporation

*Research Intern*

Houston, TX

May 2023 - Aug 2023

### Pactera

*AI intern*

Dalian, China

May 2019 - Aug 2019

### Emory University

*Research Assistant*

Atlanta, GA

May 2018 - May 2019

## REFeree EXPERIENCE

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### Program committee

AAAI 2023 Fall symposium on Artificial Intelligence and Climate

### Session chair

International Meeting for Applied Geoscience and Energy 2023, 2024

### Journal reviewer

Acta Geophysica

Computers and Geosciences

Earth Sciences

Earth Science Informatics

Geophysics

Geophysical Prospecting

Geoscientific Model Development

IEEE Transactions on Geoscience and Remote Sensing

Journal of Applied Geophysics

Journal of Geophysics and Engineering

Journal of Geophysical Research: Machine Learning and Computation

Journal of Geophysical Research: Solid Earth  
Journal of Open Research Software  
Journal of Open Source Software  
Pure and Applied Geophysics

### Conference proceeding reviewer

AAAI 2023 Fall symposium on Artificial Intelligence and Climate  
ICLR 2024 workshop on AI4DifferentialEquations  
International Meeting for Applied Geoscience and Energy 2023, 2024  
SciMLCon 2022  
58th US Rock Mechanics / Geomechanics Symposium

### Award reviewer

Georgia Tech President's Undergraduate Research Award 2022, 2023

## ACADEMIC SERVICE

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### Georgia Institute of Technology Geophysical Society

*President*

*Secretary*

Atlanta, GA

Oct 2020 - Sep 2022

Nov 2019 - Oct 2020

### Office of Undergraduate Studies, Emory University

*Academic Fellow*

Atlanta, GA

Aug 2018 - May 2019

## TEACHING EXPERIENCE

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### Georgia Institute of Technology

*Teaching Assistant*, Seismic Monitoring CO<sub>2</sub> Storage

*Head Teaching Assistant*, Computational Data Analysis

*Teaching Assistant*, Exploration Seismology

*Teaching Assistant*, Iterative Methods for Systems of Equations

Atlanta, GA

Spring 2022

Fall 2021

Spring 2021

Fall 2020

### Emory University

*Teaching Assistant*, Probability and Statistics I & II

*Teaching Assistant*, Foundation of Mathematics

Atlanta, GA

Fall 2018, Spring 2019

Summer & Fall 2018, Spring 2019

## HONORS AND AWARDS

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2022 IMAGE's Student Oral Paper Honorable Mention

SEG Technical Program Registration grant

SEG/Chevron Student Leadership Symposium travel grant

Graduate with Highest Honors (*summa cum laude*), Emory University

Phi Beta Kappa Honor Society Membership

Dean's List, Emory University

Apr 2023

Aug 2021

Jun 2020

May 2019

Apr 2019

Aug 2017 - May 2019

## GRANTS

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SEG Field Camp grant (\$1000)

*Studying 1886 Earthquake at Summerville, South Carolina – Seismic Nodal Deployment in the Field*

2022

## SKILLS

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Languages: Julia, Python, MATLAB, Java, C/C++, Bash, SQL, PHP, R, MPI

Machine Learning Libraries: PyTorch, Tensorflow, JAX, Flux.jl

Cluster/Cloud Service Platforms: Slurm, Amazon Web Services (AWS), Microsoft Azure

Document Preparation Systems: Markdown, L<sup>A</sup>T<sub>E</sub>X, html

## PREPRINTS

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- **Ziyi Yin**, Rafael Orozco, and Felix J. Herrmann. “WISER: multimodal variational inference for full-waveform inversion without dimensionality reduction”. May 2024. DOI: [10.48550/arXiv.2405.10327](https://doi.org/10.48550/arXiv.2405.10327).
- Tamas Nemeth, Kurt Nihei, Alex Loddock, Anusha Sekar, Ken Bube, John Washbourne, Luke Decker, Sam Kaplan, Chunling Wu, Andrey Shabelansky, Milad Bader, Ovidiu Cristea, and **Ziyi Yin**. “Superstep wavefield propagation”. May 2024. DOI: [10.48550/arXiv.2406.05154](https://doi.org/10.48550/arXiv.2406.05154).

## JOURNAL ARTICLES

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- **Ziyi Yin**, Mathias Louboutin, Olav Møyner, and Felix J. Herrmann. “Time-lapse full-waveform permeability inversion: a feasibility study”. May 2024. Accepted for publication in *The Leading Edge*. DOI: [10.48550/arXiv.2403.04083](https://doi.org/10.48550/arXiv.2403.04083).
- **Ziyi Yin\***, Rafael Orozco\*, Mathias Louboutin, and Felix J. Herrmann. “WISE: full-Waveform variational Inference via Subsurface Extensions”. Apr 2024. In: *Geophysics*. DOI: [10.1190/geo2023-0744.1](https://doi.org/10.1190/geo2023-0744.1). **Featured in Geophysics Bright Spot in The Leading Edge.**
- **Ziyi Yin**, Rafael Orozco, Mathias Louboutin, and Felix J. Herrmann. “Solving multiphysics-based inverse problems with learned surrogates and constraints”. Oct 2023. In: *Advanced Modeling and Simulation in Engineering Sciences*. DOI: [10.1186/s40323-023-00252-0](https://doi.org/10.1186/s40323-023-00252-0).
- Mathias Louboutin\*, **Ziyi Yin\***, Rafael Orozco, Thomas J. Grady II, Ali Siahkoohi, Gabrio Rizzuti, Philipp A. Witte, Olav Møyner, Gerard J. Gorman, and Felix J. Herrmann. “Learned multiphysics inversion with differentiable programming and machine learning”. Jul 2023. In: *The Leading Edge*. DOI: [10.1190/tle42070474.1](https://doi.org/10.1190/tle42070474.1).
- Thomas J. Grady II, Rishi Khan, Mathias Louboutin, **Ziyi Yin**, Philipp A. Witte, Ranveer Chandra, Russell J. Hewett, and Felix J. Herrmann. “Model-Parallel Fourier Neural Operators as Learned Surrogates for Large-Scale Parametric PDEs”. Jun 2023. In: *Computers & Geosciences*. DOI: [10.1016/j.cageo.2023.105402](https://doi.org/10.1016/j.cageo.2023.105402).
- Yijun Zhang, **Ziyi Yin**, Oscar Lopez, Ali Siahkoohi, Mathias Louboutin, Rajiv Kumar, and Felix J. Herrmann. “Optimized time-lapse acquisition design via spectral gap ratio minimization”. Apr 2023. In: *Geophysics*. DOI: [10.1190/geo2023-0024.1](https://doi.org/10.1190/geo2023-0024.1).
- **Ziyi Yin**, Huseyin Tuna Erdinc, Abhinav Prakash Gahlot, Mathias Louboutin, and Felix J. Herrmann. “Derisking geologic carbon storage from high-resolution time-lapse seismic to explainable leakage detection”. Jan 2023. In: *The Leading Edge*. DOI: [10.1190/tle42010069.1](https://doi.org/10.1190/tle42010069.1).

## CONFERENCE PROCEEDINGS

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- Abhinav Prakash Gahlot, Huseyin Tuna Erdinc, Rafael Orozco, **Ziyi Yin**, Felix J. Herrmann. “Inference of CO2 flow patterns – a feasibility study”. Oct 2023. In: *NeurIPS 2023 Workshop - Tackling Climate Change with Machine Learning*. DOI: [10.48550/arXiv.2311.00290](https://doi.org/10.48550/arXiv.2311.00290).
- Yijun Zhang\*, **Ziyi Yin\***, Oscar Lopez, Ali Siahkoohi, Mathias Louboutin, and Felix J. Herrmann. “3D seismic survey design by maximizing the spectral gap”. Aug 2023. In: *Third International Meeting for Applied Geoscience & Energy Expanded Abstracts*. DOI: [10.1190/image2023-3895546.1](https://doi.org/10.1190/image2023-3895546.1).
- Huseyin Tuna Erdinc\*, Abhinav Prakash Gahlot\*, **Ziyi Yin**, Mathias Louboutin, and Felix J. Herrmann. “De-risking Carbon Capture and Sequestration with Explainable CO2 Leakage Detection in Time-lapse Seismic Monitoring Images”. Nov 2022. In: *AAAI 2022 Fall Symposium - The Role of AI in Responding to Climate Challenges*. DOI: [10.48550/arXiv.2212.08596](https://doi.org/10.48550/arXiv.2212.08596).

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\* denotes equal contribution.

- **Ziyi Yin**, Ali Siahkoohi, Mathias Louboutin, and Felix J. Herrmann. “Learned coupled inversion for carbon sequestration monitoring and forecasting with Fourier neural operators”. Aug 2022. In: *Second International Meeting for Applied Geoscience & Energy Expanded Abstracts*. DOI: [10.1190/image2022-3722848.1](https://doi.org/10.1190/image2022-3722848.1). **Student oral paper honorable mention.**
- Mathias Louboutin, Philipp A. Witte, Ali Siahkoohi, Gabrio Rizzuti, **Ziyi Yin**, Rafael Orozco, and Felix J. Herrmann. “Accelerating innovation with software abstractions for scalable computational geophysics”. Aug 2022. In: *Second International Meeting for Applied Geoscience & Energy Expanded Abstracts*. DOI: [10.1190/image2022-3750561.1](https://doi.org/10.1190/image2022-3750561.1).
- Yijun Zhang, Mathias Louboutin, Ali Siahkoohi, **Ziyi Yin**, Rajiv Kumar and Felix J. Herrmann. “A simulation-free seismic survey design by maximizing the spectral gap”. Aug 2022. In: *Second International Meeting for Applied Geoscience & Energy Expanded Abstracts*. DOI: [10.1190/image2022-3751690.1](https://doi.org/10.1190/image2022-3751690.1).
- **Ziyi Yin**, Mathias Louboutin, Felix J. Herrmann. “Compressive time-lapse seismic monitoring of carbon storage and sequestration with the joint recovery model”. Sep 2021. In: *First International Meeting for Applied Geoscience & Energy Expanded Abstracts*. DOI: [10.1190/segam2021-3569087.1](https://doi.org/10.1190/segam2021-3569087.1).
- **Ziyi Yin**, Rafael Orozco, Philipp A. Witte, Mathias Louboutin, Gabrio Rizzuti, and Felix J. Herrmann. “Extended source imaging, a unifying framework for seismic & medical imaging”. Sep 2020. In: *SEG Technical Program Expanded Abstracts 2020*. DOI: [10.1190/segam2020-3426999.1](https://doi.org/10.1190/segam2020-3426999.1).

## THESES

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- **Ziyi Yin**. “Solving geophysical inverse problems with scientific machine learning”. *PhD dissertation*.
- **Ziyi Yin**. “Edge Detection and Enriched Subspaces”. May 2019. *BSc Dissertation*. URL: <https://etd.library.emory.edu/concern/etds/7w62f916x?locale=en>.