

ZEYUAN SONG

School of Chemical Engineering
Oklahoma State University
Stillwater, OK 74078

☎ +1 (405) 332-6460
✉ taekwon.song@okstate.edu
🌐 <https://github.com/taekwonzysong>

EDUCATION

- Ph.D., Oklahoma State University**, Chemical Engineering (GPA: 3.74) Expected December 2025
Advisor: Dr. Zheyu Jiang
- MSc., University of Macau**, Mathematics 2022
- MSc., Shandong University**, Operations Research and Cybernetics 2022
- BSc., Shandong University of Science and Technology**, Dual Degrees in Statistics and Law 2019

RESEARCH EXPERIENCE

- School of Chemical Engineering, Oklahoma State University** January 2022– Present
Graduate Research Assistant
- Developed a novel data-driven global random walk (DRW) numerical method incorporating adaptive L -schemes, global random walk and neural networks to model water flow dynamics in soil using the Richards equation
 - Extended DRW algorithm to solve fractional Richards equation and its inverse problem by integrating DRW with Bayesian optimization
 - Developed a new explainable, mathematically grounded AI architecture that integrates adaptive Fourier decomposition (AFD) and Bayesian variational autoencoder for the first time to solve complex PDEs in general settings
- Department of Mathematics, University of Macau** March 2021 – July 2021
Graduate Research Assistant
- Developed and proved a weak pre-orthogonal adaptive Fourier decomposition (WPOAFD) theorem to decompose functions in H^2 space on the Kepler manifold
 - Developed and proved a weak pre-orthogonal adaptive Fourier decomposition (WPOAFD) theorem to represent solutions of Helmholtz equation

TEACHING EXPERIENCE

- Department of Mathematics, University of Macau** September 2020 – December 2021
Graduate Teaching Assistant
- Courses taught: *Discrete Mathematics* (MATH1000), *Mathematics Experiment* (MATH3005) and *Quantitative Reasoning for Science and Technology* (GEST1004)

PEER-REVIEWED JOURNAL ARTICLES

2. Song Z, Sun Z. Representing Functions in H^2 on the Kepler Manifold via WPOAFD Based on the Rational Approximation of Holomorphic Functions. *Mathematics*. 2022;10(15):2729
1. Song TZ, Zhen XC, Gao W, Zhu W. Identification of Potential Driving Genes in Prostatic Cancer using Complex Network Analysis. *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*. 2022;10(6):616–621

PEER-REVIEWED CONFERENCE PROCEEDINGS

2. Song Z, Jiang Z. A Data-driven Modeling Approach for Water Flow Dynamics in Soil. *Computer Aided Chemical Engineering*. 2023;52:819–824

1. Song Z, Jiang Z. A Data-driven Random Walk Approach for Solving Water Flow Dynamics in Soil Systems. *Proceedings of Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC)*. 2023;

WORKING MANUSCRIPTS

3. Song Z, Jiang Z. An Efficient, Explainable Bayesian Framework for Inverse Problems in Precision Agriculture. 2024
2. Song Z, Jiang Z. A Physics-based, Data-driven Numerical Framework for Anomalous Diffusion for Water in Soil. 2024
1. Song Z, Jiang Z. A Novel Data-driven Numerical Method for Hydrological Modeling of Water Infiltration in Porous Media. *arXiv preprint arXiv:231002806*. 2023;
 - In revision for publication in *Chemical Engineering Science*

PRESENTATIONS

7. Song Z, Jiang Z. DRW-BO: A Bayesian Framework for Parameter Estimation for Fractional Richards Equation with Applications in Precision Agriculture. 2024. 2024 AIChE Annual Meeting, San Diego, CA (**Oral Talk**)
6. Song Z, Jiang Z. A Data-driven Numerical Method for Solving Water Flow Dynamics in Soil. 2023. 2023 AIChE Annual Meeting, Orlando, FL (**Oral Talk**)
5. Song Z, Jiang Z. A Data-driven Numerical Framework for the Richards Equation for Sustainable Irrigation and Food Production. 2023. 2023 AIChE Annual Meeting, Orlando, FL (**Oral Talk**)
4. Song Z, Jiang Z. A Computationally Efficient Data-Driven Framework for Solving Water Flow Dynamics in Soil Via Fractional Diffusion Model. 2023. 2023 AIChE Annual Meeting, Orlando, FL (**Oral Talk**)
3. Song Z, Jiang Z. A Data-driven Modeling Approach for Water Flow Dynamics in Soil. 2023. 33rd European Symposium on Computer Aided Process Engineering, Athens, Greece (**Poster Presentation**)
2. Song Z. A Data-driven Random Walk Approach for Solving Water Flow Dynamics in Soil Systems. 2023. CHE Spring Graduate Seminar, Stillwater, OK (**Oral Talk**)
1. Song Z, Jiang Z. A Data-driven Random Walk Approach for Solving Water Flow Dynamics in Soil Systems. 2023. Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC), San Antonio, TX (**Oral Talk**)

HONORS AND AWARDS

Overall Excellence in Science, Shandong University of Science and Technology	2019
Shandong University Graduate Student Scholarship, Shandong University	2019, 2020
First Prize in 10th Chinese Mathematics Competition	2018
First Prize in 9th Shandong Province Mathematics Competition	2018
Third Prize in May Day Mathematical Contest in Modeling	2016
Honorable mention in Certificate Authority Cup International Mathematical Contest in Modeling	2016