Yinuo (Noah) Yao

Contact Information

Assistant Professor
Civil and Environmental Engineering
Texas A&M University

E-mail: yyao@tamu.edu
Personal Website
Google Scholar

Research Interests

Computational Fluid Dynamics (CFD); Water and Wastewater Treatment; Energy Storage; Artificial Intelligence; Membrane Technologies; Environmental Biotechnology; Homogenization Theory; Multiscale Modeling.

Education

Ph.D. in **Civil and Environmental Engineering** 2016 – 2021
Stanford University, Stanford, CA, USA

- Dissertation Topic: "Particle resolved simulations of particle-flow interactions in fluidized beds to optimize design and operation of domestic wastewater treatment systems"
- Advisors: **Craig S. Criddle** and **Oliver B. Fringer**
- Readers: Perry L. McCarty and Robert F. Hickey

M.S. in **Institute for Computational and Mathematical Engineering (ICME)** 2018 – 2021
Stanford University, Stanford, CA, USA

M.S. in **Civil and Environmental Engineering** 2015 – 2017
Stanford University, Stanford, CA, USA

B.ENG. (First Class Honors) in **Environmental Engineering** 2011 – 2015
National University of Singapore, Singapore

Relevant Employments

Assistant Professor in **Civil and Environmental Engineering** 2023 – Present
Texas A&M University, College Station, Texas, USA

Postdoctoral Researcher in **Energy Science and Engineering** 2021 – 2023
Advisor(s): **Ilenia Battiato**
Collaborator(s): **Ali Mani** and **Meagan Mauter**
Stanford University, Stanford, CA, USA

Graduate Research Assistant in **Civil and Environmental Engineering** 2015 – 2021
Advisor(s): **Craig S. Criddle** and **Oliver B. Fringer**
Stanford University, Stanford, CA, USA

Site Operator at **Codiga Resource and Recovery Center (CR2C)** 2016 – 2018
Stanford University, Stanford, CA, USA

Undergraduate Research Assistant in **Civil and Environmental Engineering** 2012 – 2015
Advisor(s): **How Yong Ng**
National University of Singapore, Singapore, Singapore

Preprints

1. **Yao, Y.**, Harabin, P., Behandish, M., & Battiato., I. Non-intrusive two-way coupled hybrid method for multiscale heat transfer: Thermal runaway in a battery pack. ***preprint, arXiv:2303.11087***, In review.

Publications

(‡‡ denotes equal contributions)

1. **Yao, Y.**, Yu, S., & Battiato., I. (2023). Understanding Flow Dynamics in Membrane Distillation: Effects of Reactor Design on Polarization. ***Separation and Purification Technology***, 314, 123664.
2. Yousefzadeh, M.‡‡, **Yao, Y.**‡‡, & Battiato, I. (2023). A Level-Set Immersed Boundary Method for Reactive Transport in Complex Topologies with Moving Interfaces. ***Journal of Computational Physics***, 111958.
3. **Yao, Y.**, Beigert, E., Vowinckel, B., Köllner. T, Meiburg. E., Balachandar, S., Criddle, C. S., & Fringer, O. B. (2022). Particle-resolved simulations of four-way coupled, polydispersed, particle-laden flows. ***International Journal of Numerical Method in Fluids***, 94, 1810-1840.
4. **Yao, Y.**, Fringer, O. B., & Criddle, C. S. (2022). CFD-accelerated bioreactor optimization: reducing the hydrodynamic parameter space. ***Environmental Science: Water Research & Technology***, 8, 456-464.
5. **Yao, Y.**, Criddle, C. S., & Fringer, O. B. (2021). Competing flow and collision effects in a monodispersed liquid-solid fluidized bed at a moderate Archimedes number. ***Journal of Fluid Mechanics***, 927, A28.
6. **Yao, Y.**, Criddle, C. S., & Fringer, O. B. (2021). Comparison of the properties of segregated layers in a bidispersed fluidized bed to those of a monodispersed fluidized bed. ***Physical Review Fluids***, 6, 084306.
7. **Yao, Y.**, Criddle, C. S., & Fringer, O. B. (2021). The effects of particle clustering on hindered settling in high-concentration particle suspensions. ***Journal of Fluid Mechanics***, 920, A40.
8. **Yao, Y.**, Wang, Z., & Criddle, C. S. (2021). Robust nitritation of anaerobic digester centrate using dual stressors and timed alkali additions. ***Environmental Science & Technology***, 55, 2016-2026.
9. Wang, Z., **Yao, Y.**, Woo, S.-G., & Criddle, C. S. (2020). Impacts of nitrogen-containing coagulants on the nitritation/denitrification of anaerobic digester centrate. ***Environmental Science: Water Research & Technology***, 6, 3451-3459.
10. Wang, Z., Woo, S.-G., **Yao, Y.**, Cheng, H.-H., Wu, Y.-J., & Criddle, C. S. (2020). Nitrogen Removal as Nitrous Oxide for Energy Recovery: Increased Process Stability and High Nitrous Yields at Short Hydraulic Residence Times. ***Water Research***, 173, 115575.
11. Ng, K. K., Shi, X., **Yao, Y.**, & Ng, H. Y. (2014). Bio-Entrapped Membrane Reactor and Salt Marsh Sediment Membrane Bioreactor for the Treatment of Pharmaceutical Wastewater: Treatment Performance and Microbial Communities. ***Bioresource Technology***, 171, 265–273.

Conferences

1. **Yao, Y.**, Yu, S., & Battiato, I. (2023). Understanding Flow Dynamics in Membrane Distillation: Effects of Reactor Design on Polarization. *Association of Environmental Engineering & Science Professors (AEESP) at Northeastern University*. (Poster Presentation)
2. **Yao, Y.**, Yu, S., & Battiato, I. (2023). Understanding Flow Dynamics in Membrane Distillation: Effects of Reactor Design on Polarization. *International Water Association (IWA)*. (Oral Presentation)
3. **Yao, Y.**, & Battiato, I. (2022). Auto-detecting adaptive hybrid method for reactive transport in porous media. *American Geophysical Union (AGU)*. (Poster Presentation)
4. **Yao, Y.**, Fringer, O., & Criddle, C. S. (2022). CFD-accelerated bioreactor optimization by reducing the hydrodynamic parameter space. *Association of Environmental Engineering & Science Professors (AEESP) at Washington University in St. Louis*. (Poster Presentation)
5. **Yao, Y.**, Wang, A., Battiato, I., Mauter, M. S., Ling, B., & Dudchenko, A. (2021). Three-dimensional Flows and Dean Vortices in Membrane Distillation Systems. *The North American Membrane Society (NAMS)*. (Oral Presentation)
6. **Yao, Y.**, Fringer, O. B., & Criddle, C. S. (2020). Particle-resolved DNS (PR-DNS) to study the effect of flow and collisions in a monodispersed fluidized bed reactor. *Bulletin of the American Physical Society*. (Oral Presentation)
7. **Yao, Y.**, Fringer, O. B., & Criddle, C. S. (2019). Particle-Resolved DNS (PR-DNS) to Study the Bulk Settling Velocity of Poly-Dispersed Particles. *Bulletin of the American Physical Society*. (Oral Presentation)
8. **Yao, Y.**, Wang, Z., & Criddle, C. S. (2019). Complete nitritation of Anaerobic Digester Centrate without pH setpoint control. *ReNUWIt IAB Meeting*. (Poster Presentation)
9. Kim, A., **Yao, Y.**, Tilmans, S., McCarty, P. L., & Criddle, C. S. (2018). Anaerobic secondary treatment using the staged anaerobic fluidized bed membrane bioreactor. *ReNUWIt Annual Meeting*. (Poster Presentation)
10. Wang, Z., **Yao, Y.**, Woo, S.-G., & Criddle, C. S. (2018). Lab-sacle nitrous denitritation reactor in CANDO system. *ReNUWIt Annual Meeting*. (Poster Presentation)
11. **Yao, Y.**, Wang, Z., Woo, S.-G., & Criddle, C. S. (2018). Achieving long-term stable nitritation in SBRs through alternating the presence of dual stressors. *ReNUWIt Annual Meeting*. (Poster Presentation)
12. Wang, Z., Woo, S.-G., **Yao, Y.**, Power, L., Cheng H.-H., Wu, Y.-J., & Criddle, C. S. (2017) The Coupled Aerobic Anoxic Nitrous Decomposition Operation (CANDO). *ReNUWIt Annual Meeting*. (Poster Presentation)

Invited Talks

1. A multiscale approach to tackle water, energy, and infrastructure challenges for a sustainable future. **Stevens Institute of Technology**, USA, 03/2023.
2. A multiscale approach to tackle water, energy, and infrastructure challenges for a sustainable future. **Massachusetts Institute of Technology**, USA, 03/2023.
3. A multiscale approach to tackle water, energy, and infrastructure challenges for a sustainable future. **Texas A&M University**, USA, 02/2023.

4. Staged Anaerobic Fluidized-bed Membrane Bioreactor: A step towards net-zero wastewater treatment. **Auburn University**, USA, 04/2022. (Guest lecturer for CIVL7250 Biological Wastewater Treatment)
5. Using particle-resolved computational fluid dynamics simulations to optimize wastewater treatment systems: Shrinking the parameter space to accelerate reactor optimization. **University of California, Berkeley**, USA, 02/2021. (Delivered virtually due to COVID-19)
6. Physics-informed design for MINEWater systems. **Massachusetts Institute of Technology**, USA, 01/2021. (Delivered virtually due to COVID-19)

Awards and Scholarships

1. 2022 Travel grants for *Association of Environmental Engineering & Science Professors (AEESP) at Washington University in St. Louis*.
2. 2019 Computational resources for "Particle-resolved simulations to understand the effects of flow rate and particle size distributions in fluidized bed reactors" in Extreme Science and Engineering Discovery Environment (XSEDE).

Teaching Experience

Teaching Assistant, Stanford University

- CEE 172: Air Quality Management 2021
- CEE 177: Aquatic Chemistry and Biology 2021
- CEE 274D: Pathogens and Disinfection 2020
- CEE 262C: Modeling Environmental Flow 2020
- CEE 262C: Modeling Environmental Flow 2019
- CEE 273C: Environmental Engineering Applications of Membrane Technology 2016

Journal Reviewers

Environmental Science & Technology; Journal of Fluid Mechanics; Water Resources Research; Scientific Reports; Chemosphere; Water Environment Research

Service and Outreach

Student officer for Chinese-American Professors in EES (CAPEES) 2021 – 2023
Instructor for College Track (East Palo Alto, CA, USA) 2022
Reviewer for Stanford Exposure to Research and Graduate Education (SERGE) 2021
Mentor for College Track (East Palo Alto, CA, USA) 2021 – 2023
Mentor for Summer Undergraduate Research Fellowships (SURF) at Stanford University 2021
Mentor for Summer First at Stanford University 2021
Mentor for Research Experience for Undergraduates (REU) 2020
Student officer for Stanford Energy Club 2016 – 2017
Assistant for Energy@Stanford & SLAC 2016