Sidian Chen

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Education

University of Arizona
PhD student in Hydrology (major) and Applied Math (minor), overall GPA: 4.0/4.0 — *2018 – 2023*

Peking University
M.S. in Environmental Science — *2015 – 2018*

Tsinghua University
B.S. in Hydraulic and Hydropower Engineering — *2011 – 2015*

Research Interest

I am broadly interested in the fundamental physics of fluid flow and transport in environmental and energy systems in Earth's subsurface. My current research focuses on micro-scale (i.e., pore-scale) modeling of multiphase fluid flow, transport, and thermodynamic phase change behaviors in geological porous media. The specific application of my research is to study the transport of Per- and Polyfluoroalkyl Substances (PFAS) in the vadose zone, the nonisothermal evaporation processes at the land surface, and the production of gas/oil from shale formations.

Honors and Awards

1. Montgomery Prize for Outstanding Oral Presentation, El Día del Agua y la Atmósfera, 2023
2. John W. Harshbarger Memorial Scholarship, University of Arizona, 2022
3. *Outstanding Graduate Student in Research, College of Science, University of Arizona, 2022*
4. Matrix New World Engineering Best Oral Award, El Día del Agua y la Atmósfera, 2022
5. John W. Harshbarger Memorial Scholarship, University of Arizona, 2021
6. Galileo Circle Scholarship, College of Science, University of Arizona, 2021
7. Outstanding Oral Award, EarthWeek 2021 Lightning Talk Competition, University of Arizona, 2021
8. Arizona Hydrological Society-Tucson Best Oral Award, El Día del Agua y la Atmósfera, 2021
9. *Outstanding Student Presentation Award, American Geophysical Union (AGU) Fall Meeting, 2020*
10. John W. Harshbarger Memorial Scholarship, University of Arizona, 2020
11. Geosystems Analysis, Inc. Best Virtual Poster Award, El Día del Agua y la Atmósfera, 2020
12. Travel Grants, Graduate and Professional Student Council, University of Arizona, 2019
13. Shlomo and Yael Neuman Graduate Scholarship, University of Arizona, 2019

Publications

Journal paper (Published)

1. **Chen, S.**, Guo, B. "Pore-scale modeling of PFAS transport in water-unsaturated porous media: Air–water interfacial adsorption and mass-transfer processes in thin water films". *Water Resources Research*.
2. Qin, C., Wang, X., Hefny, M., Zhao, J., **Chen, S.**, Guo, B. (2022) "Wetting dynamics of spontaneous imbibition in porous media: from pore scale to Darcy scale" *Geophysical Research Letters*. e2021GL097269.
3. **Chen, S.**, Jiang, J., Guo, B. (2021) "A pore-network-based upscaling framework for the nanoconfined phase behavior in shale rocks" *Chemical Engineering Journal*. 129210.
4. **Chen, S.**, Qin, C., Guo, B. (2020) "Fully implicit dynamic pore-network modeling of two-phase flow and phase change in porous media" *Water Resources Research*. 56(11): e2020WR028510.
5. **Chen, S.**, Qin, H., Zheng, Y., Fu, G. (2019). "Modeling the overflow from sewage interception systems in a rapidly urbanizing catchment" *Journal of Environmental Management*. 233: 748-756.
6. Zheng, Y., **Chen, S.**, Qin, H., Jiao, J. (2018). "Modeling the spatial and seasonal variations of groundwater head in an urbanized area under low impact development" *Water*, 10(6): 803.
7. Xu, H., Xu, C. Y., **Chen, S.**, Chen, H. (2016). "Similarity and difference of global reanalysis datasets (WFD and APHRODITE) in driving lumped and distributed hydrological models in a humid region of China" *Journal of Hydrology*, 542: 343-356.
8. Song, F., Qin, H., **Chen, S.**, Zhao, Z. (2019). "Water source apportionment of pollutions in Shenzhen Bay basin" *Acta Scientiarum Naturalium Universitatis Pekinensis*, 55(2): 317-328. (Written in Chinese)

9. Zheng, M., **Chen, S.**, Qin, H., Leng, K., Zhang, L. (2017). "Simulation study on the effect of urban rainfall runoff pollution on eutrophication in Deep Bay, Shenzhen, China" *China Water & Wastewater*, 9: 133-138. (Written in Chinese)
10. Liu, J., **Chen, S.**, Jiang, T. (2017). "Research on marine eco-environmental carrying capacity—a case study in eastern coast ocean of Shenzhen" *Marine Environmental Science*, 36(4). (Written in Chinese)

Journal paper (In preparation)

1. **Chen, S.**, Jiang, J., Guo, B. "Phase change controls two-phase displacement patterns in porous media".
2. **Chen, S.**, Jiang, J., Guo, B. "Dynamic pore-network modeling of compositional two-phase flow and phase change behavior in nanoporous media".
3. **Chen, S.**, Guo, B. "An analytical upscaled model for PFAS transport in dual-permeability porous media with arbitrary kinetic air–water and solid–water adsorption sites".
4. **Chen, S.**, Helmig, R., Guo, B."Coupled free-flow/pore-network modeling of nonequilibrium nonisothermal evaporation in soils at the land surface: Impact of water film flow and mass and heat transfer across air–water interfaces".

Conference paper

1. **Chen, S.**, Jiang, J., Guo, B. (2021). "Effect of Pore Geometry and Heterogeneous Surface Wettability on the Nanoconfined Phase Behavior in Nanopore Networks of Shale Rocks" *Unconventional Resources Technology Conference 2021*, 5032. (Peer reviewed)
2. **Chen, S.**, Zheng, M., Qin, H., Li, X. (2017). "Effects of Low Impact Development Practices on the Mitigation of Nutrient Pollution in Deep Bay, China" *Low Impact Development Conference China 2016*, 100-107. (Peer reviewed)
3. **Chen, S.**, Qin, H., Li, S. (2017). "Modeling of Streamflow in an Underdrain System of Vegetated Dry Swales" *Low Impact Development Conference China 2016*, 85-91. (Peer reviewed)

Invited Lectures

1. Guest lecture for *Fourier Stability Analysis for Finite Differentiation Approximation*, University of Arizona, 2023
2. Guest lecture for *Finite Differentiation Approximation for Solving Second-order Ordinary Differentiation Equations & Modified Equation Analysis*, University of Arizona, 2023
3. Guest lecture for *Inverse Modeling in Vadose Zone Hydrology*, University of Arizona, 2022
4. SFB1313 Pretty Porous Science Lecture, University of Stuttgart, 2022

Conference Presentations

1. El Día del Agua y la Atmósfera, 2023 (Oral, *Outstanding Presentation Award*)
2. American Geophysical Union (AGU) Fall Meeting, 2023 (Oral)
3. Droplet Interaction Technologies Summer School at the University of Stuttgart, Germany, 2022 (Oral)
4. The XXIV International Conference on Computational Methods in Water Resources, 2022 (Oral)
5. European Geosciences Union (EGU) General Assembly, 2022 (Oral)
6. International Society for Porous Media (InterPore) Annual Meeting, 2022 (Poster)
7. PFAS-Σ-IT International PFAS Summit, 2022 (Poster)
8. El Día del Agua y la Atmósfera, 2022 (Oral, *Best Oral Award*)
9. SFB 1313 Status Seminar, 2022 (Poster)
10. American Geophysical Union (AGU) Fall Meeting, 2021 (One oral, one poster, and one invited eLighting)
11. Unconventional Resources Technology Conference, 2021 (Oral)
12. International Society for Porous Media (InterPore) Annual Meeting, 2021 (Oral)
13. El Día del Agua y la Atmósfera, 2021 (Oral, *Best Oral Award*)
14. American Geophysical Union (AGU) Fall Meeting, 2020 (Oral, *Outstanding Student Presentation Award*)
15. Geological Society of America (GSA) Annual Meeting, 2020 (Oral)
16. International Society for Porous Media (InterPore) Annual Meeting, 2020 (Oral)
17. Los Alamos-Arizona Days Conference, 2020 (Poster)

18. El Día del Agua y la Atmósfera, 2020 (Poster, *Best Virtual Poster Award*)
19. American Geophysical Union (AGU) Fall Meeting, 2019 (Oral)
20. Geological Society of America (GSA) Annual Meeting, 2019 (Oral)
21. El Día del Agua y la Atmósfera, 2019 (Oral)
22. International Low Impact Development Conference China, 2016 (Poster)

Teaching Experience

1. Teaching assistant for HWRS 404/504 Numerical Methods for Environmental Transport Problems, Spring semester, 2023
2. Teaching assistant for HWRS 405/505 Vadose Zone Hydrology, Fall semester, 2022
3. Teaching assistant for HWRS 170a Earth: Our Watery Home, Spring semester, 2020
4. Teaching assistant for HWRS 428/528 Systems Approach to Hydrological Modeling, Fall semester, 2019

Professional Service

1. *Member.* American Geophysical Union Hydrology Section Student Subcommittee (AGU-H3S), 2022 – 2023.
2. *Member.* International Society for Porous Media (InterPore) Membership Committee, 2021 – present.
3. *Volunteer Organizer.* El Día del Agua y la Atmósfera Planning Committee, 2021 – 2022.
4. *Session Chair.* (with Bo Guo, Yashar Mehmani, Francisco Carrillo, Hamdi Tchelepi, Xinyi Shen, and Prakash Purswani). Pore-Scale Physics: Recent Advances in Experimental and Computational Methods, AGU Fall Meeting (virtual), December 2021.

Review Service

Journal reviewer

- Water Resource Research
- Advance in Water Resources
- Journal of Fluid Mechanics
- Earth-Science Reviews
- Lab on a Chip
- Journal of Petroleum Science and Engineering
- Transport in Porous Media
- ACS Omega

Grant reviewer

- Travel and Research Grants, Graduate and Professional Student Council, University of Arizona, 2020 – 2022

Professional Societies

- American Geophysical Union (AGU)
- European Geosciences Union (EGU)
- Geological Society of America (GSA)
- International Society for Porous Media (InterPore)