Shaojie Hu

Ph.D. student
College of Civil Engineering
Hunan University
Lushan Road (S), Yuelu District
Changsha, Hunan Province 410082

sjhu@hnu.edu.cn
sjhu7.github.io

Research Interest

Unsaturated soils, Poromechanics, Adsorption, and Freezing in porous media.

Education

Ph.D., Geotechnical Engineering Sep. 2020 – Present
Hunan University, Changsha, China
Supervisor: Prof. Chao Zhang

B.S., Civil Engineering Sep. 2016 – Jun. 2020
Hunan University, Changsha, China

Publications

Journal Articles (* Corresponding author)

[1] **Hu, S.**, Zhao, N., Zhang, C.*, Li, F., Chen, R., & Or, D.* (2025). Water Nanofilms Facilitate Ice Crystal Growth across Droplets. ***Physical Review Letters***, *134*(6), 064001. DOI: 10.1103/PhysRevLett.134.064001

[2] **Hu, S.**, Zhang, C.*, Dong, Y., Gou, L., & Chen, R. (2025). Water Vapor Sorption Isotherms of Salt-affected Soils. ***Canadian Geotechnical Journal***, cgj-2024-0426. DOI: 10.1139/cgj-2024-0426

[3] **Hu, S.**, Zhang, C.*, & Lu, N. (2023). Quantifying Coupling Effects Between Soil Matric Potential and Osmotic Potential. ***Water Resources Research***, *59*(2), e2022WR033779. DOI: 10.1029/2022WR033779

[4] **Hu, S.**, & Zhang, C.* (2023). A Sorption Isotherm Model for Soil Incorporating External and Internal Surface Adsorption, and Capillarity. ***Canadian Geotechnical Journal***, cgj-2022-0386. DOI: 10.1139/cgj-2022-0386

[5] Zhang, C., Zhao, N., **Hu, S.***, & Lin, X. (2025). Salts retard ice crystal growth in supercooled droplets during recalescence. ***Physical Review Fluids***, *10*(6), 063605. DOI: 10.1103/mt89-z2jw

[6] Gou, L., Lu, N., **Hu, S.**, Calderon, A. R. A., & Zhang, C.* (2025). Suction Stress of Soil Slurry. ***Journal of Geotechnical and Geoenvironmental Engineering***, *151*(2), 04024164. DOI: 10.1061/JGGEFK.GTENG-12758

[7] Lin, X., Zhang, C.*, **Hu, S.**, & Chen, R. (2024). Heterogeneous ice nucleation of salt solution in porous media. ***The Journal of Chemical Physics***, *160*(9), 094501. DOI: 10.1063/5.0190862

[8] Zhang, C., Li, L., **Hu, S.***, Gou, L., & Chen, R. (2024). Physical origin of adsorption heat and its significance in the isotherm equation. ***International Journal of Heat and Mass Transfer***, *220*, 124914. DOI: 10.1016/j.ijheatmasstransfer.2023.124914

[9] Zhao, N., **Hu, S.**, Zhang, C.*, Li, F., & Chen, R. (2023). Physical Origins of Freezing and Melting Temperature Depressions of Water in Millimeter-sized Pores. ***Colloids and Surfaces A: Physicochemical and Engineering Aspects***, *674*, 131851. DOI: 10.1016/j.colsurfa.2023.131851

[10] Gou, L., Zhang, C.*, Lu, N., & **Hu, S.** (2023). A Soil Hydraulic Conductivity Equation Incorporating Adsorption and Capillarity. ***Journal of Geotechnical and Geoenvironmental Engineering***, *149*(8), 04023056. DOI: 10.1061/JGGEFK.GTENG-11388

[11] Gou, L., Zhang, C.*, **Hu, S.**, Chen, R., & Dong, Y. (2023). Semi-analytical Solutions for Soil Consolidation Induced by Drying. ***Acta Geotechnica***, *18*(2), 739–755. DOI: 10.1007/s11440-022-01623-4

[12] Zhang, C., **Hu, S.**, Qiu, Z., & Lu, N.* (2022). A Poroelasticity Theory for Soil Incorporating Adsorption and Capillarity. ***Géotechnique***, 1–18. DOI: 10.1680/jgeot.22.00097

[13] Zhang, C., Gou, L., **Hu, S.***, & Lu, N. (2022). A Thermodynamic Formulation of Water Potential in Soil. ***Water Resources Research***, *58*(9). DOI: 10.1029/2022WR032369

[14] Zhang, C.*, **Hu, S.**, & Lu, N. (2022). Unified Elastic Modulus Characteristic Curve Equation for Variably Saturated Soils. ***Journal of Geotechnical and Geoenvironmental Engineering***, *148*(1), 04021171. DOI: 10.1061/(ASCE)GT.1943-5606.0002718

Presentations

Ice at the Micro-scale 2025, Ascona, Switzerland — July 2025
Poster: Salts retard ice crystal growth in supercooled droplets during recalescence

AGU24, Washington, D.C., United States — December 2024
Poster: Phase equilibrium and transitions in salt-affected soils

InterPore2024, Qingdao, China — May 2024
Oral: Adsorption-induced Effective Stress in Porous Media (On behalf of Prof. Zhang)

The 4th International Soil Modeling Consortium (ISMC) Conference, Tianjin, China — May 2024
Poster: Coupling Between Soil Matric Potential and Osmotic Potential

InterPore2023, Edinburgh, Scotland — May 2023
Poster: A Poroelasticity Theory for Soil Incorporating Adsorption and Capillarity

The 9th Young Experts Forum on Geotechnical Engineering, Changsha, China — Jun. 2021
Oral: Unified Elastic Modulus Function for Variably Saturated Soils

Academic Service

Editorial Board
Vadose Zone Journal, Social Media Editor, Jan. 2025 - present

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