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RESEARCH INTERESTS

- Soil Dynamics and Geotechnical Earthquake Engineering
- Soil Properties and Microstructure
- Engineering Geology and Geotechnical Testing

EDUCATION

South China University of Technology, Guangzhou, Guangdong

Ph.D. in Geotechnical Engineering, 2018

- Thesis: Mineral Composition Based Experimental Study of Dynamic Behaviors of Quaternary Marine Fine-grained Soil in the Typical Estuary Deltas of Guangdong

Shantou University, Shantou, Guangdong

M.S. in Structural Engineering, 2013

- Thesis: Analysis of Soil Dynamic Parameters and Soil Dynamic Behaviors of Saturated Soft Clay under Cyclic Loading

Nanchang University, Nanchang, Jiangxi

B.S. in Civil Engineering, 2010

ACADEMIC EXPERIENCE

Visiting fellow (2021-present), Department of Geosciences, University of Padova, Padova, Italy

Postdoctoral fellow (2020-present), School of Civil Engineering, Guangzhou University, Guangzhou, China

Postdoctoral fellow (2018-2020), School of Architecture, South China University of Technology, Guangzhou, China

PROFESSIONAL QUALIFICATIONS

Registered structure engineer II(P.R. China), since 2012

F.E. in Structural Engineering (P.R. China), since 2011

F.E. in Geotechnical Engineering (P.R. China), since 2013

PROFESSIONAL AFFILIATIONS

A.M.ASCE, Geotechnical Engineering Institute

RESEARCH PROJECTS

Ongoing Projects

National Natural Science Foundation of China (Grant No.52008121): *Study on the transitional failure mode and micro mechanism of low-plasticity fine-grained soil under cyclic loading*, 2021-2023, CNY 240,000 (PI).

Chinese Postdoctoral Science Foundation (Grant No. 2020M682652): *Study on multi-scale dynamic characteristics and transitional failure mechanism of low-plasticity fine-grained soil under cyclic loading*, 2021-2022, CNY 80,000 (PI).

International Training Program Foundation for Young Outstanding Scientific Research Talents in Guangdong Province, China. 2021-2022, CNY 300,000 (PI).

National Natural Science Foundation of China (Grant No.51878192): *Immersed tube tunnel earthquake damage mechanism and control method research*, 2019-2022, CNY 600,000 (Key member).

Natural Science Foundation of Guangdong Province (Grant No.2020A1515010713): *Study on the seismic effect of karst site in urban karst area and its influence on underground structures based on the geological characteristics of karst cave*, 2020-2023, CNY 100,000 (Key member).

International (Regional) Cooperation and Exchange Program of National Natural Science Foundation of China (Grant No.52011530394): *Seismic Damage Mechanisms and Control Methods of Immersed Tunnel*, 2021-2022, CNY 100,000 (Key member).

Key International (Regional) Joint Research Project (Grant No.52020105002): *Intelligent Approach for Sensing and Evaluation of the Failure of Long Tunnels Under Complex Dynamic Loads*, 2021-2025, CNY 2,930,000.

Completed Projects

National Key Research and Development Program of China (Grant No.2017YFC1500404): *Research on seismic control ground motion parameters of Marine engineering*, 2017-2021, CNY 2,430,000.

National Key Research and Development Program of China (Grant No.2016YFC0800205): *Disaster control technology of earthquake failure coupled with major urban infrastructure in coastal soft soil base*, 2016-2020, CNY 3,100,000.

State Key Laboratory of Subtropical Building Science (Grant No.2019ZB26): *Study on the dynamic characteristics of Marine fine-grained soils from typical Estuarine deltas in Guangdong province*, 2019-2020, CNY 50,000 (PI).

Fundamental Research Funds for the Central Universities (Grant No.2017MS014): *Study on disaster mechanism and risk Assessment method of long-term operation of urban rail transit tunnel project in Karst area*, 2017-2018, CNY 80,000 (Key member).

National Natural Science Foundation of China (Grant No.51508200): *Study on the influence mechanism and process parameters of construction boundary in sand flow method foundation treatment of immersed tube tunnel*, 2015-2017, CNY 250,000 (Key member).

State Key Laboratory of Subtropical Building Science (Grant No.2015ZA20): *Study on the microstructure of soft soil foundation with high moisture content reinforced by consolidation method*, 2015-2016, CNY 100,000 (Key member).

National Natural Science Foundation of China (Grant No.51208211): *Study on the Creep characteristics of soft soils in The Pearl River Delta region by microscopic test and constitutive model*, 2013-2015, CNY 250,000.

CONSULTING EXPERIENCE

China Railway 16th Bureau Group Co. Ltd.: *Study on design and construction technology of complex deep excavation of high-speed railway tunnel in zero section* (2014).

China Railway 16th Bureau Group Co. Ltd.: *Study on the stress of prestressed concrete simply supported Box Girder support of viaduct platform in Guangning Station of Guiyang-Guangzhou Railway* (2014).

South China University of Technology Architectural Design Research Institute Co. Ltd.: *Analysis and evaluation of slope stability of Hilton Hotel in Agile Tengchong Project* (2014).

China Nonferrous Metal Changsha Survey and Design Institute Co. Ltd.: *Dynamic properties on the tailings dam of Taiping Tailings Reservoir Project (Phase II and III)* (2014).

South China University of Technology Architectural Design Research Institute Co. Ltd.: *Evaluation of the foundation pit support in Greenland Financial Center* (2015).

South China University of Technology Architectural Design Research Institute Co. Ltd.: *Evaluation of the impact of foundation pit of Guangzhou Higher Education Mega Center Exhibition Hall on Guangzhou Metro Line 4* (2015).

China Communications Construction Company (CCCC) Fourth Harbor Engineering Research Institute Co. Ltd.: *Numerical simulation of formation displacement induced by large diameter soil pressure balance shield excavation in composite formation* (2016).

Guangzhou Metro Design and Research Institute Co. Ltd.: *Study on comprehensive Technology of urban rail transit construction in Karst area* (2016).

China Coal Technology and Engineering Group (CCTEG) Shenyang Research Institute Co. Ltd.: *Study on key problems of rock mechanics in pipe jacking construction in the deep roadway of the coal mine* (2017).

Guangzhou Municipal Engineering Design and Research Institute Co. Ltd.: *Research on key technology and seismic response after breaking the inclined anti-slide pile into mountain tunnel under complex conditions* (2021).

Guangzhou Metro Design and Research Institute Co. Ltd.: *Study on slope stability of metro mainline considering rainfall and train operation conditions* (2022).

Guangzhou Municipal Engineering Design and Research Institute Co. Ltd.: *Seismic response and vulnerability of key joints of super-large diameter shield tunnel under fault condition* (2022).

PUBLICATIONS

*Journals paper (underlined authors represent current/former graduate students, * authors represent the corresponding author)*

1. **Yi Shan**, Jitong Zhao, Huawei Tong, Jie Yuan*, Donglin Lei, Yuanyuan Li. "Effects of activated carbon on liquefaction resistance of calcareous sand treated with microbially induced calcium carbonate precipitation," *Soil Dynamics and Earthquake Engineering*, 2022. (Revised for Journal)
2. Dongzhuo Zhao, **Yi Shan***, Peng Wang, Jing Xu. "Seismic performance analysis of exposed column-base connections along minor axis," *Journal of Constructional Steel Research*. 2022. (Revised for Journal)
3. Jiayun Liang, Jie Cui, Yadong Li*, **Yi Shan**. "Upper bound analysis of asymmetric collapse mechanism of shallow tunnel under seismic load," *Chinese Journal of Rock Mechanics and Engineering (in Chinese)*. 2022. (Accepted for Publication Journal)
4. Jinwen Zhou, Jie Cui, Rui Dong, Yadong Li*, **Yi Shan**. "Study on shell-spring model for longitudinal dynamic response analysis of buried pipeline," *Journal of Earthquake Engineering and Engineering Vibration (in Chinese)*. 2022. (Accepted for Publication Journal)
5. Jiayun Liang, Jie Cui, Yi Lu*, Yadong Li, **Yi Shan**. "Limit Analysis of Shallow Tunnels Collapse Problem with Optimized Solution," *Applied Mathematical Modelling*. 2022. (Accepted for Publication Journal)
6. Wei Li, Shuzhuo Liu, **Yi Shan***, Weixiang Sun. "Effect of different moisture content on rheological properties and rheological parameters of marine clay," *Journal of Guangdong Ocean University (in Chinese)*. 2022; 42(2):1-6.
7. Xing Wang, **Yi Shan***, Jie Cui, Yu Zhong, Jianhua Shen, Xinzhi Wang, Changqi Zhu. Dilatancy of the foundation filling material of island-reefs in the South China Sea. *Construction and Building Materials*. 2022; 323:126524. (JCR Q1, IF=6.141)
8. **Yi Shan**, Junling Liang, Huawei Tong, Jie Yuan*, Jitong Zhao. "Effect of different fibers on small-strain dynamic properties of microbially induced calcite precipitation-fiber combined reinforced calcareous sand," *Construction and Building Materials*. 2022; 322:126343. (JCR Q1, IF=6.141)
9. Jie Yuan, Donglin Lei, **Yi Shan***, Huawei Tong, Xiaotian Fang, Jitong Zhao. "Direct Shear Creep Characteristics of Sand Treated with Microbial-Induced Calcite Precipitation," *International Journal of Civil Engineering*. 2022: 1-15. (JCR Q3, IF=2.081)
10. **Yi Shan**, Jie Cui, Haitao Wen, Shuman Yu*, Yadong Li. "Analysis of dynamic properties and transitional failure of clay-sand mixture in fine-grained soil based on mineral composition," *Engineering Geology*. 2022; 296:106464. (JCR Q1, IF=6.755)
11. Wenbo Wang, Yadong Li*, Mengxiong Tang, Hang Chen, Chunlin Liu, **Yi Shan**, Jie Cui. "Application of infinite element boundary in dynamic time history analysis of semi-infinite domain," *Building Structure (in Chinese)*. 2021; 51(S2):598-603.
12. **Yi Shan**, Xing Wang*, Jie Cui, Haihong Mo, Yadong Li. "Effects of clay mineral composition on the dynamic properties and fabric of artificial marine clay," *Journal of Marine Science and Engineering*. 2021; 9(11):1216. (JCR Q2, IF=2.574)
13. Yadong Li, Jianfeng Li, Jie Cui, **Yi Shan***, Yanfei Niu. "Experimental study on calcium carbide residue as a combined activator for coal gangue geopolymer and feasibility for soil stabilization," *Construction and Building Materials*. 2021; 312:125465. (JCR Q1, IF=6.141)
14. **Yi Shan**, Xiqun Ke*. "Reexamination of collapse failure of fine-grained soils and characteristics of related soil indexes," *Environmental Earth Sciences*. 2021; 80:402. (JCR Q2, IF=2.784)
15. Meng Xiao, Jie Cui*, Yadong Li, **Yi Shan**, Xing Wang. "Propagation and attenuation characteristics of Rayleigh waves in the irregular bottom of the ocean in porous half-spaces," *Waves in Random and Complex Media*. 2021: 1-22. (JCR Q1, IF=4.853)
16. Jitong Zhao, Huawei Tong, **Yi Shan**, Jie Yuan*, Qiuwang Peng, Junling Liang. "Effects of different types of fibers on the physical and mechanical properties of micp-treated calcareous sand," *Materials*. 2021; 14(2):268. (JCR Q1, IF=3.623)
17. **Yi Shan**, Qinglin Meng, Shuman Yu, Haihong Mo, Yadong Li*. "Energy based cyclic strength for the influence of mineral composition on artificial marine clay," *Engineering Geology*. 2020; 274:105713. (JCR Q1, IF=6.755)

18. Jianfeng Li, Jie Cui, **Yi Shan**, Yadong Li*, Bo Ju. "Dynamic shear modulus and damping ratio of sand-rubber mixtures under large strain range," *Materials*. 2020; 13(18):4017. (JCR Q1, IF=3.623)
19. Xiqun Ke, Junsheng Chen, **Yi Shan***. "A new failure criterion for determining the cyclic resistance of low-plasticity fine-grained tailings," *Engineering Geology*. 2019; 261:105273. (JCR Q1, IF=6.755)
20. Shuman Yu, **Yi Shan***. "Experimental Comparison and Study on Small-Strain Damping of Remolded Saturated Soft Clay," *Geotechnical and Geological Engineering*. 2017; 35(5):2479-2483. (Ei Compendex)
21. Haihong Mo, **Yi Shan**, Huizi Li, Shuzhuo Liu, Junsheng Chen*. "Energy-based method for analyzing accumulative plastic strain growth of tailing silt," *Chinese Journal of Geotechnical Engineering (in Chinese)*. 2017; 39(11):1956-1966. (Ei Compendex)
22. **Yi Shan***, Haihong Mo, Shuman Yu, Junsheng Chen. "Analysis of the Maximum Dynamic Shear Modulus and Particle Arrangement Properties of Saturated Soft Clay Soils," *Soil Mechanics and Foundation Engineering*. 2016; 53(4):226-232. (JCR Q4, IF=0.806)
23. Haihong Mo, **Yi Shan**, Hao Ma, Junsheng Chen*. "Experimental study of dynamic shear moduli and microscopic-pore structure of soft clay," *Chinese Journal of Rock Mechanics and Engineering (in Chinese)*. 2016; 35(7):1445-1451. (Ei Compendex)
24. Shuzhuo Liu, Huizi Li, **Yi Shan**, Kang Li, Linzhen Ba*. "Energy method for analyzing dynamic pore water pressure model for tailing soil," *Chinese Journal of Geotechnical Engineering (in Chinese)*. 2016; 38(11):2051-2058. (Ei Compendex)

Conference paper (underlined authors represent current/former graduate students)

1. Xiqun Ke, Junsheng Chen, Weidong Pan, **Yi Shan**. "An Energy-based Process Evaluation for Low-plasticity Fine-grained Soils during Cyclic Loading," *Proceedings of the Geo-Congress 2020: Earthquake Engineering and Soil Dynamics*, 2020, ASCE, Minneapolis, USA.
2. **Yi Shan**, Junsheng Chen, Xiqun Ke, Haihong Mo. "Resonant Column Test Study of the Effect of Clay Minerals on Maximum Dynamic Shear Modulus in Marine Clay," *Proceedings of the 7th International Conference on Earthquake Geotechnical Engineering*, 2019, CRC Press, Roma, Italy.

STUDENT ADVISEES

Current Master's Students (11 in progress)

1. Zhonghong Qiu, *Study on the transitional failure of low-plasticity fine-grained soil based on discrete element method (DEM)*.
2. Wei Li, *Experimental study on the influence of soil rheological properties based on plate test*.
3. Wenbo Wang, *Vibration table test of the flexible joint in ultra-long immersed tube tunnel*.
4. Jinwen Zhou, *Test and numerical simulation of water stop joint in immersed tube tunnel*.
5. Fuming Xie, *Experimental study on durability of clay reinforced with coal gangue and calcium carbide slag*.
6. Yuanyuan Li, *Experimental study on physical and mechanical properties and microstructure of microbial solidified sand reinforced with particle gradation*.
7. Junling Liang, *Experimental study on physical and mechanical properties and microstructure of microbial solidified sand reinforced with particle size and shape*.
8. Dongling Lei, *Experimental study on microbial-induced microstructural reinforcement of sand based on Computerized Tomography (CT) image processing technology*.
9. Zhentong Huang, *Experimental study on static and dynamic properties of sand-clay mixture based on binary system and energy method*.
10. Ziliang Zhang, *Study on static and dynamic properties of microbial-reinforced sand based on discrete element method (DEM)*.
11. Huizhi Zhou, *Experimental study on small-strain dynamic properties of microbial-reinforced calcareous sand based on particle size and gradation*.

Completed Master's Students (12 completed)

1. Huizi Li (2016), *Research of the transition failure based on energy method of tailings soil under the cyclic loading*.
2. Xiqun Ke (2020), *Energy-based research on cyclic failure mode and failure criterion of Taiping tailings*. (National Scholarship for Chinese Graduate Student)
3. Haitao Wen (2020), *Experimental study on dynamic characteristics and transitional failure of sand-clay mixed fine-grained soil based on mineral composition*.

4. Zhipeng Su (2021), *Experimental study on dynamic characteristics and volume proportion of sand-clay mixed fine-grained soil based on mineral composition.*
5. Feiyu Huang (2021), *Experimental study on static and dynamic characteristics of granite residual soil based on grain and mineral loss.*
6. Peiyan Fan (2021), *Analysis and numerical simulation of granite residual soil slope based on long-term rainfall monitoring.*
7. Jianfeng Li (2021), *Experimental study on static and dynamic characteristics of clay reinforced with coal gangue and calcium carbide slag.* (National Scholarship for Chinese Graduate Student)
8. Huaen Liu (2021), *Study on ground motion response of ultra-long immersed tube tunnel based on reaction displacement method*
9. Jitong Zhao (2021), *Experimental study on microbial solidified calcareous sand based on activated carbon content.*
10. Rongkang Qiu (2021), *Study on physical and mechanical properties and microscopic characteristics of microbial solidified sand reinforced with carbon fiber.* (National Scholarship for Chinese Graduate Student)
11. Jiaming Liu (2021), *Experimental study on physical and mechanical properties and microstructure of microbial solidified sand in the salt solution.*
12. Guocheng Zhang (2021), *Experimental study on physical, mechanical, and deformation properties and microstructure of microbial solidified sand reinforced with Mg-Ca ion concentration.*