An aerial photograph of a mountain valley with a river and a large white geometric logo. The logo is a stylized 'A' shape composed of thick white lines, with a crescent moon shape inside it. The background shows a valley with a river, terraced fields, and mountains in the distance under a blue sky with some clouds.

Sep.23-24 8:00-18:00

2023

Center of Rock Mechanics and Geohazards, Shaoxing University

The 3rd Shaoxing International Forum on
Rock Mechanics and Engineering Geology
(SXFRG) & IAEG XIV Congress Theme 9:
Technological Innovation in Engineering
Geology

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The 3rd Shaoxing International Forum on Rock Mechanics and Engineering Geology
 ---IAEG XIV Congress Session 9: Technological Innovation in Engineering Geology

September 23-24, 2023
 CHENGDU, CHINA

**The 3rd Shaoxing International Forum
 on Rock Mechanics and Engineering Geology (SXFRG)
 &
 IAEG XIV Congress Theme 9: Technological Innovation in
 Engineering Geology**

Conference Manual

**Chengdu, China
 September 23-24, 2023**



华东勘测设计研究院有限公司
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华东勘测设计研究院有限公司
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The 3rd Shaoxing International Forum on Rock Mechanics and Engineering Geology

---IAEG XIV Congress Session 9: Technological Innovation in Engineering Geology

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INVITATION

The 3rd Shaoxing International Forum on Rock Mechanics and Engineering Geology (SXFRG) and the 9th session of the 14th International Congress on Engineering Geology and the Environment, "Innovations in Engineering Geology" (hereinafter referred to as "the Forum") will be held on September 23-25, 2023 at Chengdu Century City International Convention Centre. The forum is held in the form of a sub-session of the International Congress on Engineering Geology and Environment, which is also hosted by Shaoxing University and organized by the International Association of Engineering Geology and Environment (IAEG), Chinese Society of Rock Mechanics and Engineering (CSRME), Geological Society of China, IAEG China National Group, State Key Laboratory of Geohazard Prevention and Geoenvironment Protection of Chengdu University of Technology, Key Laboratory of Rock Mechanics and Geohazards of Zhejiang Province, PowerChina Huadong Engineering Corporation Limited, Zhejiang Rock Innovation, Hangzhou Ruhr Technology Co., Ltd., Shaoxing Education Bureau, Huadong Engineering Corporation Limited, Zhejiang Rock Innovation, Hangzhou Ruhr Technology Co., Ltd, and Shaoxing City Investment and Renewable Resources Co., Ltd. More than 20 other organizations have provided sponsorship and support.

The 3rd SXFRG, with the theme of " Technological Innovation in Rock Mechanics and Engineering Geology", aims to showcase and promote innovative technological achievements in the field of geological engineering. It seeks to foster the development of rock mechanics and engineering geology theories and applied technologies, strengthen the application of relevant innovative technologies in infrastructure construction, and usher in a more convenient and intelligent era of geological engineering.

We sincerely invite you to be together with us on the forum.

Prof. Rafiq Azzam and Prof. Faquan WU



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Theme Chair



Rafiq Azzam
RWTH Aachen
University



Faquan Wu
Shaoxing University

ORGANIZER

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- Chinese Society for Rock Mechanics and Engineering (CSRME)
- Geological Society of China
- IAEG China National Group
- Chengdu University of Technology
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- Key Laboratory of Rock Mechanics and Geohazards of Zhejiang Province
- PowerChina Huadong Engineering Corporation Limited
- Zhejiang Rock Innovation
- Hangzhou Ruhr Technology Co., Ltd.
- Chang'an University
- Journal of Rock Mechanics and Geotechnical Engineering

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AGENDA

Hall: Crystal Hall 3		Date: Sept. 23	
T09S01: Technological Innovation in Engineering Geology (3rd Shaoxing International Forum)>Advanced Monitoring Technologies for Geoengineering			
Time	Paper ID	Speaker	Paper Title
08:20-08:40	B891	Chao Zhou Invited	Evaluation of loess collapsibility based on a simple elastoplastic model and in-situ time-domain reflectometry tests
08:40-09:00	B892	Dongsheng Xu Invited	Recent development of advanced monitoring technologies in coral reef engineering
09:00-09:15	B641	Jiewei Zhan	Characterization of Pre- and Post-failure Deformation and Evolution of the Shanyang Landslides Using Multi-temporal Remote Sensing Data
09:15-09:30	98	Yongxiu Zhou	A novel Remote Sensing Landslide Semantic Segmentation Method: Using cycleGAN- based Change Detection Algorithms
09:30-09:45	B844	Hui Hu	The Application of Visual Deformation Monitoring Techniques in Geological Hazards Monitoring and Early Warning
09:45-10:00	B472	Linan Liu	Investigate Tunneling-induced Ground Subsidence using Integrated InSAR and Machine Learning Techniques
10:00-10:15	224	Qingpeng Pei	Design of Landslide Monitoring System Based on Wireless Sensor Network
10:15-10:45		Coffee Break	
Time	Paper ID	Speaker	Paper Title
10:45-11:05	B447	Honghu Zhu Invited	Multi-physical Landslide Monitoring with a Fiber-optic Nerve System
11:05-11:25	B460	Daoyuan Tan Invited	A Novel Method for Integrity Assessment of Soil-Nailing Works with Actively Heated Fiber Optic Sensors
11:25-11:40	251	Kai Gu	Groundwater Flow Characterization in Strata of Loose Sediments using Actively Heated Fiber Optics Based Thermal Response Test
11:40-11:55	B756	Abd Ullah	Investigation of Concrete-steel Interaction in Composite Member via Distributed Fibre Optic Sensor Technology
11:55-12:10	B929	Kai Zhou	Secured Drapery System: Tests, Design Principals and Experiences

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Hall: Crystal Hall 3			Date: Sept. 23
T09S03: Technological Innovation in Engineering Geology (3rd Shaoxing International Forum)>New Laboratory Techniques and Their Applications in Engineering Geology			
Time	Paper ID	Speaker	Paper Title
13:20-13:40	B779	Arindam Basu Invited	Evaluating shear behavior of 'real' natural rock discontinuities (Keynote Lecture)
13:40-14:00	B828	Shengwen Qi Invited	A New Dynamic Direct Shear Apparatus for Discontinuities
14:00-14:20	B445	Zihan Liu Invited	A Computational Algorithm for Calculating Fracture Index of Core Runs
14:20-14:35	B831	Rui Kong	Test Apparatus and Technology to Determine Complete Stress-strain Process for Hard Rocks under True Triaxial Stress Path
14:35-14:50	B647	Shuang Yang	Stress-dependent Wave Propagation in Dry Sandstones Considering Void Compaction Under Uniaxial Load
14:50-15:05	407	Hani Meree	A Numerical Study on the performance of Traditional Concrete and Three-Dimensional Printed Concrete Dams under the Boulder Impact
15:05-15:20	B434	Wei Yao	Experimental Apparatus for Observing Full Friction Process Using Hopkinson Torsion Bar
15:20-15:50			Coffee Break
Time	Paper ID	Speaker	Paper Title
15:50-16:10	B495	Jia-Jyun Dong Invited	Laboratory Measurement of Fluid Storage and Migration Parameters of Intact Rocks and Rock Joints
16:10-16:30	B499	Cho Sang Ho Invited	Dynamic Direct Shear Tests of Jointed Rock using compact CNS Direct Shear Box
16:30-16:45	B719	Jie Wu	Rock Mechanical Portable Laboratory System
16:45-17:00	B450	Hua Li	Comparison of High-frequency Components in Acoustic Emissions from Rock Fracture under Mode I and Mode II Dominated Loading
17:00-17:15	B192	Kaiwen Xia	Laboratory Earthquakes Decipher Control and Stability of Rupture Speeds
17:15-17:30	344	Mingliang Zhou	An ANN-based Constitutive Model for Interbedded Hydrate-bearing Sediments
17:30-17:45	629	Zexu Ning	Assessment of Similarity for Rock-like Material Prepared by 3d Printing Technology
17:45-18:00	321	Yong Chen	Thermal Properties of Phase Change Material Incorporated Subgrade Clay

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Hall: Crystal Hall 3		Date: Sept. 24	
T09S02: Technological Innovation in Engineering Geology (3rd Shaoxing International Forum)>In-situ Geo-technology			
Time	Paper ID	Speaker	Paper Title
08:00-08:20	B60	Yujie Wang Invited	Intelligent recognition for parameters of rock masses based on the digital drilling technique
08:20-08:40	B71	Kai Zhang Invited	Real-time estimating method on rock strength via MWD of roofbolter and its application to in-situ grouting quality evaluation
08:40-08:55	B62	Siyuan Wu	Time series analyses of Measurement While Drilling (MWD) data for in-situ ground evaluation
08:55-09:10	638	Peng Li	Research on Mechanism and Application of Rotary Penetration Test
09:10-09:25	B320	Wendal Victor Yue	Drilling Dynamic Model for Drilling Resistance Characterization based on Newtonian Mechanics
09:25-09:40	476	Dingmao Peng	A new classification method of karst vertical morphology in bridge site area based on drilling data
09:40-09:55	B153	Xuefan Wang	New in-situ method for quality assessment and project management of ground improvement
09:55-10:10	B266	Weifeng Sun	Study on in-situ Soil Moisture Measurement in Hole
10:10-10:45		Coffee Break	
Time	Paper ID	Speaker	Paper Title
10:10-10:30	B878	Chun'an Tang Invited	Spalling in extreme ground motion and evidence from the 2008 Wenchuan earthquake
10:30-10:50	B838	Wenjie Xu Invited	CoSim – A new software for geomechanics and geohazards
10:50-11:05	B851	Pengzhi Pan	Development of CASRock for modeling of deep hard rock fracturing process
11:05-11:20	B742	Chun Liu	Numerical analysis of CO ₂ transfer in fractured rock based on an improved discrete model
11:20-11:35	B850	Chun Feng	CDEM: a Continuous Discontinuous Numerical Analysis Method for Geological Bodies
11:35-11:50	B744	Hongyuan Liu	Development and application of a parallelised hybrid finite-discrete element method for geohazard mitigation and prevention
11:50-12:05	B409	Qinyuan Liang	Study on Inverse Size Effect of Rock Uniaxial Compressive Strength Based on Grain Based Model Reconstruction Method
12:05-12:20	B4	Gang Mei	A Deep Learning Approach Using Graph Convolutional Networks for Slope Deformation Prediction Based on Time-series Displacement Data

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Time	Paper ID	Speaker	Paper Title
13:20-13:40	B746	Eugene Voznesensky Invited	Spatial Heterogeneity of Soil Properties from 2D and 3D Engineering Geological Modelling
13:20-13:40	B188	Michael Celia Invited	Fluid Leakage along Old Oil and Gas Wells: Modeling and Measurements
14:00-14:15	662	Pengcheng Ma	Research on application of new standard penetration test in Tianjin metro project
14:15-14:30	217	Dongming Zhang	Evaluation of Soil Properties at Pile Location based on CPT Data Using Spectral Clustering and Hidden Markov Chain
14:30-14:45	145	Dongdong Fan	Prediction on Ground Settlement Due to Pumping by a Hybrid Method
14:45-15:00	361	Runqing Ye	Study on Engineering Geology Petrofabric Regionalization of Slope Surface Based on Multi-Source Data
15:00-15:15	16	Jiangrong Hou	On stability of a slope with bedrock using the upper bound limit analysis
15:15-15:30	B3	Yuting Yang	Deep Transfer Learning Approach for Identifying Slope Surface Cracks

Hall: Crystal Hall 3		Date: Sept. 24	
T09S04: Technological Innovation in Engineering Geology (3rd Shaoxing International Forum)>Current Trends and Future Perspectives of Machine Learning Applications in Geoscience and Engineering Geology			
Time	Paper ID	Speaker	Paper Title
15:50-16:10	267	Yimeng Zhou Invited	Feasibility and Challenges of Computer Vision-based Automatic Rock Type Classification
16:10-16:25	432	Chengyong Fang	A New Coseismic Landslides Prediction Model Based on Extreme Gradient Boosting Decision Tree
16:25-16:40	235	Feifan Ren	Prediction of Maximum Reinforcement Load of Reinforced Soil Retaining Walls Based on Machine Learning
16:40-16:55	239	Ning Ma	Deep Learning deriving New Generation Geophysical Interpretation for Landslide by Microtremor method
16:55-17:10	320	Qingming Li	A Preliminary Framework of Standard Sequence of Rock-soil Strata Based on the Large Database
17:10-17:25	B237	Nikolay Nikiforov	The First Artificial Intelligence-Powered Cloud System for Engineering Geology
17:25-17:40	B306	Fan Meng	Multilevel Wavelet Decomposition Network for Missing Acoustic Well Log Reconstruction
17:40-17:55	B741	Abd Rasid Jaapar	Leveraging on Machine Learning for Managing Geohazard Impacts to Structural Assets

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Outstanding Innovative Achievements in Geotechnical Engineering Technology

In preparation for the Shaoxing International Forum, the organizing committee conducted three Shaoxing Forum lecture series from 2020 to 2022, namely "Geotechnical Engineering Chinese Software", "Geotechnical Engineering Chinese Instruments", and "Geotechnical Engineering Chinese Technology". Through expert selection organized by the Geological Engineering Technology Working Committee of the Chinese Society for Rock Mechanics and Engineering, outstanding achievements in software, instruments, and technology in the field of Chinese geotechnical engineering will be unveiled to the world during this Shaoxing International Forum.

No.	Achievement	Author	Affiliation
1	High-Pressure True Triaxial Hard Rock Full Stress-Strain Process Testing System	Xia-Ting Feng	Northeastern University
2	Dynamic Catastrophe Theory of Engineering Rock Mass and Its Significant Engineering Applications	Shengwen Qi	Institute of Geology and Geophysics, Chinese Academy of Sciences
3	Simulation Methods and Monitoring Early Warning of Rock Mass Catastrophes	Chun'an Tang	Dalian University of Technology
4	SMRM Engineering Rock Mass Rapid Testing and Analysis System	Faquan Wu	Shaoxing University Zhejiang Rock Innovation
5	The International First Set of In-Situ Testing Device for Mechanical Properties of Deep-Sea Floor Sediments.	Yonggang Jia	Ocean University of China
6	Coupling Simulator - CoSim	Wenjie Xu	Tsinghua University
7	High-Performance Discrete Element Software MatDEM	Chun Liu	Nanjing University
8	Mechanisms and Analysis Methods of Deep Engineering Hard Rock Localized Failure	Pengzhi Pan	Institute of Rock and Soil Mechanics, China Academy of Sciences
9	RUHR Visual deformation monitor	Rafiq Azzam Hui Hu	RWTH Aachen Hangzhou Ruhr Technology Co., Ltd.
10	Continuous-Discontinuous Numerical Analysis Methods for Geological Bodies (CDEM)	Chun Feng	Institute of Mechanics, Chinese Academy of Sciences

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Session 1. Advanced Monitoring Technologies for Geoengineering

Convenor



Honghu Zhu

Nanjing University



Assaf Klar

Technion - Israel
Institute of
Technology



Daoyuan Tan

The Hong Kong
Polytechnic
University



Andy Y.F. Leung

The Hong Kong
Polytechnic
University

Brief Introduction

The field of geotechnical and geological engineering relies heavily on monitoring technologies to assess the performance and safety of infrastructures and risks of geo-hazards. The advent of advanced monitoring technologies and data analysis methods has revolutionized the way these structures and geohazards are monitored and managed. This session will focus on the latest advancements in monitoring technologies and their applications in geotechnical and geological engineering.

Advanced monitoring technologies play a critical role in the construction and service of geotechnical projects as well as the management of geohazards. During the last decade, there have been many advances in the development of monitoring technologies for geotechnical and geological engineering applications, including optical fiber sensors, MEMS, LiDAR, InSAR, UAVs, et al. Advanced data analysis methods, such as machine learning and artificial intelligence, are also becoming increasingly important for denoising, analysis, fusion, and interpretation of the monitoring data. These methods can help to identify patterns and anomalies in large datasets, making it easier to predict potential hazards and manage geo-risks. This session will explore the latest advances in monitoring

technologies for geoengineering, including remote sensing and in-situ measurements as well as the implementation of advanced data analysis methods and algorithms in geoengineering monitoring. The session will feature presentations by experts in the field, who will discuss the challenges and opportunities associated with monitoring geoengineering projects.

The theme of this session is “Advanced monitoring technologies for geoengineering”. This session on advanced monitoring technologies for geoengineering will provide an opportunity for experts in the field to share their research and insights on the latest developments in this rapidly evolving area. Prominent scholars and experts will be invited to give speeches sharing their latest achievements in monitoring technologies, theories, methods, applications, as well as ideas on specific challenges. By bringing together experts in monitoring technologies and geoengineering, this session aims to foster collaboration and innovation, enabling the development of more effective and sustainable solutions to address the challenges of climate changes.



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Session 2. In-situ Geo-technology

Convenor



Zhongqi Quentin Yue
 The University of Hong Kong



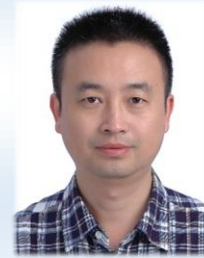
Michael Celia
 Princeton University



Chun'an Tang
 Dalian University of Technology



Yujie Wang
 China Institute of Water Resources and
 hydropower Research



Hao Wang
 Institute of Rock and Soil Mechanics,
 Chinese Academy of Sciences

Brief Introduction

This session is about the recent development and progress of in-situ geo-technology. The in-situ geo-technology is one of the most important subjects in Engineering Geology and the Environment and can be one important part of the Theme 09 entitled “New Technology in Engineering Geology-3rd Shaoxing International Forum”. This session will provide a platform for researchers around the world to discuss and exchange their studies in in-situ geo-technology. Most importantly, in-situ technology of drilling process monitoring and/or measurement while drilling has been well developed and progressed in recent years. It can be an effective and environmental-friendly in-situ technology for a habitable earth.



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Session 3. New Laboratory Techniques and Their Applications in Engineering Geology

Convenor



Kaiwen Xia
China University of
Geosciences
(Beijing)



Sangho Cho
Chonbuk National
University



Hongyuan Liu
University of
Tasmania



Zhengzhao Liang
Dalian University of
Technology

Brief Introduction

Over the years, the development of engineering geology has always been accompanied by opportunities and challenges, and its research achievements hold significant importance for engineering construction, disaster assessment, and ecological environmental protection. As human engineering activities interact and influence the natural geological environment, new engineering geological problems gradually emerge. To address the conflicts and contradictions between human engineering activities and the natural geological environment, numerous pioneering theoretical explorations and technological innovations are continually being conducted. These studies provide fresh ideas and means for achieving harmony between human engineering activities and nature, leading to the correct utilization of geological conditions and rational solutions to geological problems in practical engineering.

This session focuses on the latest research findings related to a series of issues in the field of engineering geology, showcasing a large number of novel experimental theories, methods, and technologies. It also expands the application areas of relevant achievements, aiming to inspire engineering geologists' approaches, enrich existing research techniques, and optimize research systems. Furthermore, it aims to provide reliable scientific bases for the rational design, smooth construction, and normal operation of engineering projects. The symposium aims to promote the research and development of international engineering geology, contributing to the safety of major engineering projects and the socio-economic development. Addressing prominent issues in geological engineering is a crucial goal of this symposium.



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Session 4. Current Trends and Future Perspectives of Machine Learning Applications in Geoscience and Engineering Geology

Convenor



Efstratios Karantanellis
University of Michigan



Anika Braun
Technische Universität Berlin



Jie Dou
China University of
Geosciences

Brief Introduction

Machine learning (ML) has been proven to be successful in different domains and the general development is surely furthered by openly accessible algorithms and datasets for the geocommunity to work with. ML first emerged from the field of Artificial Intelligence (AI) in which computers emulate human behavior. It enables a data analysis process to extract meaningful insights from raw datasets and provides accurate results based on algorithms. ML algorithms and techniques have been applied widely in the geoscience field with varied results. It is now incumbent for society to examine the two key issues of quality and value in the geo-applications. ML has also made its way into engineering geology, facilitating the analysis of increasing amounts of data and automatizing laborious tasks. Its benefit concerns the ability to exploit large datasets and identify patterns and trends that might not be apparent to a human cognition.

Examples of ML applications in engineering geology are:

- feature detection/object-based image classification to detect e.g.; landslides, rock fall deposits, faults, discontinuities, etc. in remotely sensed data at different scales, e.g., satellite or drone, optical images or digital elevation data, hyperspectral data;
- point cloud classification, e.g., for rock mass characterization;
- time series analysis/forecasting, e.g., for deformation monitoring or rainfall threshold estimation;
- landslide susceptibility and hazard assessment, e.g., for large areas.