DACOMA

CONFERENCE BROCHURE

The 6th International Conference on

Data-Driven Computing and Machine Learning in Engineering

DACOMA-26

第六届工程数据驱动计算与机器学习国际会议

16–18 October 2026, Shanghai, China

Fudan University Handan Campus · 复旦大学邯郸校区



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Campus Entrance Issue

For verification before entering the campus, please present your original ID (身份证、护照等原件) or Shanghai QR Code/Suishenma (随申码).

Contact

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Transportation Guide

Transport Hub	Taxi / Ride-hailing	Subway Route	Total Subway Time
Shanghai Pudong International Airport (PVG)	60-80 mins normally; up to 90 mins during rush hours	Line 2 (Xujing East) to Longyang Road, transfer to Line 18 (Changjiang South Road), then Fudan University Station Exit 2	75-90 mins
Shanghai Hongqiao International Airport (SHA, T1/T2)	40-55 mins normally; up to 65 mins during rush hours	Line 10 (Jilong Road) to Guoquan Road, transfer to Line 18 (Changjiang South Road), then Fudan University Station Exit 2	60-70 mins
Shanghai Hongqiao Railway Station	40-55 mins normally; up to 65 mins during rush hours	Line 10 (Jilong Road) to Guoquan Road, transfer to Line 18 (Changjiang South Road), then Fudan University Station Exit 2	55-65 mins
Shanghai Railway Station	20-30 mins normally; up to 40 mins during rush hours	Line 3/4 (outer loop) to Baoshan Road, transfer to Line 18 (Changjiang South Road), then Fudan University Station Exit 2	35-45 mins
Shanghai South Railway Station	40-50 mins normally; up to 60 mins during rush hours	Line 1 (Fujin Road) to People's Square, transfer to Line 8, then transfer to Line 18 (Changjiang South Road) at Hongkou Football Stadium; alight at Fudan University Station Exit 2	55-70 mins



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About DACOMA-26

In the age of big data, machine learning technology has been effectively utilized in various fields such as image processing, genomics, engineering computing, macroeconomic forecasting, and medical diagnosis. However, despite its success, applying data-driven computing and machine learning in engineering analytics still presents many unresolved challenges.

With the aim of promoting research and the application of big data analysis, data-driven computing, and artificial intelligence in engineering, as well as fostering scientific exchanges among scientists, practitioners and engineers from related disciplines, the DACOMA conference series has been successfully held since 2019.

The 1st DACOMA — Shanghai, China, 2019
The 2nd DACOMA — Beijing, China, 2022
The 3rd DACOMA — Beijing, China, 2023
The 4th DACOMA — Nanjing, China, 2024
The 5th DACOMA — Beijing, China, 2025
The 6th DACOMA — Shanghai, China, 2026

The **6th International Conference on Data-Driven Computing and Machine Learning in Engineering (DACOMA-26)** will be held at Fudan University, 220 Handan Road, Yangpu District, Shanghai, China, from 16 to 18 October 2026. The conference is guided by the Chinese Society of Theoretical and Applied Mechanics and hosted by Fudan University and Tongji University with the **Institute of Computational Mechanics and Artificial Intelligence**, Fudan University serving as the organizing institute.

The conference is co-organized by Tsinghua University, Leibniz University Hannover, Bauhaus-Universität Weimar, Beijing Institute of Technology, Hohai University, and Shanghai Society of Theoretical and Applied Mechanics. Professor Timon Rabczuk, Professor Hehua Zhu, and Professor Zhuo Zhuang will serve as Conference Chairs, while Professor Xu Guo and Professor Guoqiang Li will serve as Honorary Conference Chair.

DACOMA-26 will continue to focus on cutting-edge research in machine learning and artificial intelligence, with applications across engineering and science.

About CM×AI, Fudan University

The Institute of Computational Mechanics and Artificial Intelligence (CM×AI), Fudan University, was established in May 2025 by Prof. Timon Rabczuk. Based in Shanghai, the institute aligns with national development strategies and integrates scientific computing with artificial intelligence (AI) to enhance modeling and predictive capabilities. It promotes interdisciplinary collaboration and transformative innovation across advanced manufacturing, energy, biomedicine, aerospace, and materials science.

The institute bridges computational mechanics with AI, materials science, biomedical engineering, and energy and environmental sciences. By integrating mechanics, physics, applied mathematics, and computer science, it employs numerical methods, including the finite element method (FEM), to model and predict complex physical phenomena involving solid mechanics, fluid dynamics, and material and structural stability. Looking ahead, the institute aims to advance the deep integration of computational mechanics and AI, enabling intelligent and automated workflows from model development and numerical simulation to post-processing. Its core research areas include computational mechanics modeling and software development, integrated materials engineering, multiscale methods, scientific AI, and CAD–CAE integration. Key directions encompass intelligent computational mechanics and digital twins, AI-driven engineering simulation, intelligent materials and adaptive structures, and intelligent computational software platforms driven by both data and physical principles.

Conference Arrangement

GUIDANCE UNIT

Chinese Society of Theoretical and Applied Mechanics

ORGANIZERS

Fudan University

Tongji University

CO-ORGANIZERS

Tsinghua University
Leibniz University Hannover
Bauhaus University Weimar
Beijing Institute of Technology
Hohai University
Shanghai Society of Theoretical and Applied Mechanics

CONFERENCE VENUE

Fudan University, 220 Handan Road, Yangpu District,
Shanghai, China

CONFERENCE DATE & WEBSITE

16 - 18 October, 2026
www.dacoma.org.cn

CONFERENCE CHAIRS

Timon Rabczuk



Bauhaus University Weimar
Fudan University

Hehua Zhu



Tongji University

Zhuo Zhuang



Tsinghua University

HONORARY CHAIR

Guoqiang Li



Tongji University

Xu Guo



Dalian University of Technology

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Conference Venue

Fudan University

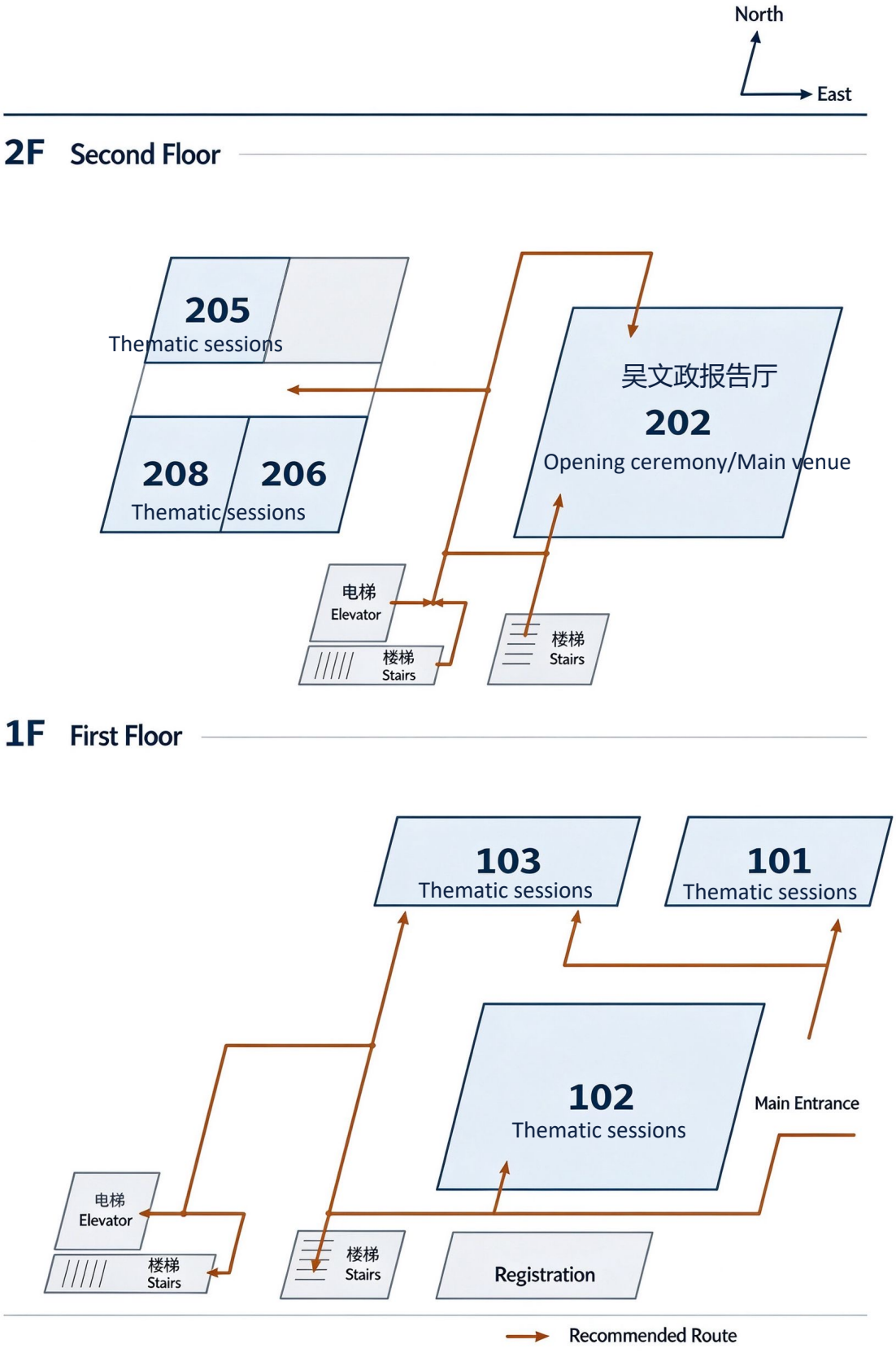
220 Handan Road, Yangpu District, Shanghai, China

DACOMA-26 will be held at Guanghua Tower East Wing of Fudan University Handan Campus (复旦大学邯郸校区**光华楼东辅楼**).
The campus is a short walk from Fudan University Station (Metro Line 18), Exit 2.



Floor Map of the Venue

Guanghua Tower East Wing of Fudan University Handan Campus
复旦大学邯郸校区光华楼东辅楼



DETAILED PROGRAM

Conference Agenda

October 16–17, 2026

October 16 (Friday)			
15:00–20:00	**Registration & Welcome**	On-site registration at 1st Floor of Guanghua Tower East Wing (光华楼东辅楼1楼) of Fudan University Handan Campus	

October 17 (Saturday)		Room 202 (吴文政报告厅), Guanghua Tower East Wing	Chair
08:30–09:00	**Opening Ceremony**	**Open Remarks** – Prof. Libo Wu, Assistant to the President of Fudan University **Welcome Remarks** – Prof. Timon Rabczuk, Conference Co-Chair **Welcome Remarks** – Prof. Guoqiang Li , Conference Honorary Chair **Photo Session**	**Zhuo Zhuang**
09:00–09:45	**Plenary Lecture 1**	Prof. Zhuo Zhuang, Tsinghua University — AI Empowers the Neural Effective Model and Multi-Objective Optimization for Engineering Design	**Timon Rabczuk**
09:45–10:30	**Plenary Lecture 2**	Prof. Goangseup Zi, Korea University — Ontology-Based Framework for Machine-Interpretable Construction Codes and AI Applications	**Zhanli Liu**
10:30–10:45		Coffee Break	
10:45–11:30	**Plenary Lecture 3**	Prof. Moubin Liu, Peking University — An AI-Enhanced SPH Framework for Whole-Process Dynamic Simulation of Cardiovascular Diseases	**Timon Rabczuk**
11:30–12:15	**Plenary Lecture 4**	Prof. Guoliang Huang, Peking University — From Inverse Design to Material Intelligence: Deep Learning in Acoustic and Elastic Metamaterials	**Xiaoying Zhuang**
12:15–13:30	**Lunch**	At 3rd floor of Danyuan Canteen (旦苑餐厅3楼) of Fudan Handan Campus	
13:30–18:00	**Thematic Sessions**	Parallel thematic sessions：Theme 01， 02, 03, 05, 07, 11, 13, 14, 15, 16, 17， 18	
18:30–20:30	**Banquet**	Conference banquet for all participants at Banquet Hall of 3rd Floor of Fuxuan Hotel（复宣酒店3楼宴会厅）	

DETAILED PROGRAM

Conference Agenda

October 18, 2026

October 18 (Sunday)			Chair
08:30–09:15	Plenary Lecture 5	Prof. Min Xie, City University of Hong Kong — Data-Driven and Machine Learning Approaches for Systems Engineering and Associated Problems	Timon Rabczuk
09:15–10:00	Plenary Lecture 6	Prof. Tienchong Chang, Shanghai University — Solution-Guided Machine Learning for Nanofilm Indentation Mechanics	
10:00–10:20		Coffee Break	
10:20–11:05	Plenary Lecture 7	Prof. Pattabhi R. Budarapu, IIT Bhubaneswar — From High-Fidelity Impact Simulation to AI-Enabled Predictive Mechanics	Zhuo Zhuang
11:05–11:50	Plenary Lecture 8	Prof. Klaus Hackl, Ruhr University Bochum — Model-Free Data-Driven Simulation of Elasto-Plastic Materials	
11:50–13:30	Lunch	At 3rd floor of Danyuan Canteen (旦苑餐厅3楼) of Fudan Handan Campus	
13:30–17:35	Thematic Sessions	Parallel thematic sessions： Theme 04, 06, 08, 09, 10, 12, 19	

PLENARY LECTURE SPEAKER

Prof. Zhuo Zhuang



PLENARY LECTURE

AI Empowers the Neural Effective Model and Multi-Objective Optimization for Engineering Design

AFFILIATION

School of Aerospace Engineering,
Tsinghua University, China

ABSTRACT

The Neural effective model and multi-objective optimization method enabled by artificial intelligence are proposed, which is used for designing fully composite material wing structure of large airplane. The influence laws of numerous parameters related to geometric shape and automatic weaving process on the performance of variable stiffness laminated structures are revealed. A data encoding technology for hierarchical modeling of structures is established, breaking through the bottleneck of optimization design for high-dimensional/continuous-discrete mixed-variable composite structural components and solving multi-objective collaborative optimization problems such as bending stiffness, torsional stiffness, and natural frequency of typical composite structural components.

BIOGRAPHY

Zhuo Zhuang, Professor at School of Aerospace Engineering of Tsinghua University, Academician of European Academy of Sciences and Arts (EASA), A special expert of the International Council for Science's China Committee (ISC-China), and a supervisor of the Chinese Society for Mechanics. Holds a doctorate from National University of Ireland, Dublin, Ireland, and an honorary doctorate from Swansea University, UK. Has published over 400 academic papers, authored more than 10 academic books, and obtained over 20 invention patents and 10 software copyrights.

PLENARY LECTURE SPEAKER

Prof. Goangseup Zi



PLENARY LECTURE

Ontology-Based Framework for Machine-Interpretable Construction Codes and AI Applications

AFFILIATION

School of Civil, Environmental and Architectural Engineering, Korea University, Seoul, Korea

ABSTRACT

The digital transformation of the construction industry has accelerated with the adoption of Building Information Modeling (BIM), automated design systems, and artificial intelligence (AI). Nevertheless, construction codes, specifications, and engineering procedures are still predominantly represented in document-based formats. Such representations are limited in explicitly describing semantic relationships among structural objects, design requirements, calculation procedures, and relevant code provisions, which constrains machine-based interpretation and the reliable use of domain knowledge in AI applications. This study proposes an ontology-based digitalization framework for construction codes and engineering knowledge to support AI-driven engineering applications. The framework first organizes construction codes into a structured digital library that links facility objects, engineering check items, and relevant code provisions. Quantitative and rule-based requirements are then converted into executable RuleUnits, which represent individual code provisions as machine-executable logic. Ontology is subsequently employed to define semantic and dependency relationships among these digitalized elements. In addition, the IFC data model is extended to accommodate construction-code information and support BIM-based interoperability. The resulting knowledge structure provides a domain knowledge layer for AI systems. By explicitly representing engineering entities and their relationships, the framework enables context-aware retrieval of applicable codes, tracing of related requirements, and interpretation of dependencies among design conditions, code provisions, and engineering procedures. RuleUnits further complement AI-based reasoning by executing deterministic calculations and compliance assessments that require explicit engineering logic. The proposed framework can also be extended to other forms of construction-domain knowledge, including technical manuals, construction procedures, and disaster-response guidelines. Relevant entities, actions, responsibilities, risks, and technical requirements can be represented as semantically interconnected knowledge. This structure enables AI systems to generate domain-specific responses through semantic relationships rather than simple keyword-based retrieval. This approach provides a basis for integrating construction knowledge, BIM, executable rules, and AI within a unified digital engineering environment.

BIOGRAPHY

Professor Goangseup Zi is a Professor in the School of Civil, Environmental and Architectural Engineering at Korea University, Seoul, Republic of Korea. He received his Ph.D. in Structural Engineering from Northwestern University, USA, in 2002, where he subsequently conducted postdoctoral research in Mechanical Engineering. He joined Korea University in 2004.

Professor Zi's research expertise encompasses solid and structural mechanics, fracture mechanics, computational mechanics, constitutive modeling, and advanced structural analysis and design. His research has contributed to the development of computational methods for fracture and nonlinear structural behavior, concrete engineering, and innovative onshore and offshore structural systems. More recently, his research has focused on offshore wind energy structures and the digital transformation of engineering knowledge and practice.

In addition to his academic career, Professor Zi has extensive professional and institutional leadership experience. He began his career as a bridge engineer at the Korea Infrastructure Safety and Technology Corporation and subsequently served as founder and CEO of Korea Blue Energy Total Solutions, Inc. He has held numerous leadership positions in major Korean engineering societies, including Vice President of the Korean Society of Civil Engineers, executive committee member of the Korea Concrete Institute, and Chair of the Committee for Offshore Wind Energy Substructures and Offshore Plants. He has also served as a project leader within ISO Technical Committee 71 and has advised government agencies, public infrastructure organizations, and private engineering companies.

Professor Zi has authored or coauthored more than 150 international journal publications. His research contributions have earned international recognition, including designation as a Highly Cited Researcher by Clarivate Analytics and inclusion among the world's top 2% of researchers in the Stanford University–Elsevier ranking.

PLENARY LECTURE SPEAKER

Prof. Moubin Liu



PLENARY LECTURE

An AI-Enhanced SPH Framework for Whole-Process Dynamic Simulation of Cardiovascular Diseases

AFFILIATION

**School of Mechanics and Engineering Science,
Peking University, China**

ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of death globally, with nearly 20 million deaths annually, and represent a major health burden affecting all populations. Among them, acute events caused by vascular rupture and thrombosis are the most fatal, accounting for the majority of CVD-related mortality. Despite advances in imaging and computational CVD diagnostics, most studies remain limited to the intact vessel state and cross-sectional risk assessments, lacking longitudinal resolution and predictive capacity for rupture and thrombotic evolution. Consequently, key dynamic mechanisms such as fatigue and flow pulsatility remain insufficiently resolved. To address these challenges, we present an AI-enhanced Smoothed Particle Hydrodynamics (SPH) framework for whole-process dynamic simulation of CVDs. The framework has been rigorously validated and successfully applied to patient-specific cases of aortic dissection, cerebral aneurysm, and acute coronary syndrome, achieving clinically consistent predictions while reducing time cost from several days to seconds. It represents the first approach capable of dynamically predicting the full progression of CVDs, offering a powerful tool for longitudinal study, precision prevention, and decision support.

BIOGRAPHY

Moubin Liu is a Tenured Full Professor, the Vice Dean of the School of Mechanics and Engineering Science, and the Director of the Center of Industrial Software Research, Peking University. His research interests including computational mechanics, fluid-structure interaction, multiphysics modeling and AI-enhanced engineering intelligence. He authored two popular monographs, including the first-ever book on the Smoothed Particle Hydrodynamics. He published over 180 SCI indexed papers with 10 ESI highly cited papers, and more than 18600 Google citations. He has received a number of awards from universities and scientific organizations worldwide including the International Computational Award (2019), ICACM Computational Mechanics Award (2018), First Prize in Natural Sciences from the Ministry of Education (2017), the 100 Talent Program Award from CAS (2009), and the prestigious Lee Kuan Yew Fellowship Award (2005). He is the associate editor of EABE and IJCM and the editorial Board Member of four other international journals, and has been consecutively listed by Elsevier as a “Most Cited Chinese Researcher” in Computational Mechanics from 2015 and the World's Top 2% Scientists (both career and single year) by Stanford.

PLENARY LECTURE SPEAKER

Prof. Guoliang Huang



PLENARY LECTURE

From Inverse Design to Material Intelligence: Deep Learning in Acoustic and Elastic Metamaterials

AFFILIATION

School of Mechanics and Engineering Science,
Peking University, China

ABSTRACT

The rapid growth of design complexity in acoustic and elastic metamaterials is motivating a shift from conventional optimization toward deep learning and physically intelligent design strategies. This presentation focuses on this evolution from AI-assisted inverse design to physical intelligence. Conventional inverse design relies heavily on iterative search and repeated numerical evaluations; surrogate models can substantially accelerate this process by replacing expensive physics solvers during optimization. Moving beyond search-based approaches, we introduce AcoustoGPT, a transformer-based generative framework that interprets target physical responses as design objectives and directly generates candidate metamaterial structures. For multilayer acoustic systems, the architecture is represented as a sequential structural language, enabling autoregressive generation, multiple candidate solutions, and adaptation to physical or manufacturing constraints. Finally, we move beyond using AI as an external design tool toward physical intelligence, where computation and learning are embedded directly into tunable mechanical structures. Mechanical neural networks are trained by adjusting their physical degrees of freedom to realize prescribed static deformation, nonlinear morphing, regression, and dynamic wave responses. In addition to global training strategies, we explore local learning, in which individual or neighboring tunable elements update their properties using locally available physical information, offering a pathway toward decentralized, scalable, and in-situ adaptation. The overall progression—from accelerated inverse design, to direct structural generation, to local and global physical learning—points toward metamaterials that are not only designed by AI, but can themselves learn, adapt, and compute through their physical dynamics.

BIOGRAPHY

Dr. Guoliang Huang is currently a Chair Professor of college of engineering at Peking University. He is the member of the Canadian Academy of Engineering, Fellows of ASME, SPIE and IAAM. He received his Ph.D. degree from University of Alberta, Canada in 2004. Dr. Huang's research interests include wave propagation and mechanics in elastic/acoustic metamaterials and structural materials, active mechanics, topological wave mechanics, structural dynamics, vibration and sound wave suppression. He has authored one book, 7 book chapters and more than 200 journal papers (include Nature Reviews Materials, Nature Communications, Proceedings of the National Academy of Sciences (PNAS), Advanced Materials, Physical Review Letters, Journal of Mechanics and Physics of Solids, et al.). He received the 2026 Rayleigh Lecture Award from ASME, the first recipient from a Chinese university. He is the Associate Editor of Wave Motion, Associate Editor of the ASME Journal of Applied Mechanics, the ASME Journal of Vibration and Acoustics, the field Editor-in-Chief of Frontiers in Physics, and serves in editorial broad in many other journals.

PLENARY LECTURE SPEAKER

Prof. Min Xie



PLENARY LECTURE

Data-Driven and Machine Learning Approaches for Systems Engineering and Associated Problems

AFFILIATION

Department of Systems Engineering,
City University of Hong Kong, Hong Kong SAR

ABSTRACT

Complex systems are becoming increasingly intelligent today as more AI and machine learning techniques are adopted in system design and upgrades. At the same time, new challenges are emerging that require careful attention. In this talk, we will discuss several of these issues and highlight open questions for future research. For example, many systems now deploy large numbers of sensors and collect vast amounts of data, while also using increasingly sophisticated methods. However, this often increases system complexity and introduces additional sources of risk. As a result, system reliability becomes a major challenge—especially for safety-critical applications, where catastrophic failures may occur. Intelligent systems are typically more complex and dynamic, which makes it difficult to develop accurate system models in the first place. Moreover, they often depend heavily on the availability of large datasets, which themselves may present problems such as measurement inaccuracy and uncertainty. Addressing these factors can help developers make better design and engineering decisions, ultimately reducing the likelihood of future failures.

BIOGRAPHY

Min Xie entered Univ of Science and Technology of China in 1978 after receiving the highest entrance score in a nationwide examination to the special class for the gifted. In 1979, he received a scholarship to study abroad and completed his undergraduate study at the Royal Inst of Technology in Sweden in 1984. He later completed his PhD from Linkoping Univ, Sweden in 1987. He joined the National University of Singapore in 1991 as one of the first recipients of the prestigious Lee Kuan Yew Research Fellowship. In May 2011, Prof Xie moved to the City Univ of Hong Kong as Chair Professor of industrial engineering. Prof Xie has published over 500 journal papers and 10 books. His recently co-authored book, “Cyber-Physical Distributed Systems: Modeling, Reliability Analysis and Applications”, was published by Wiley in 2021. He has advised over 80 PhD students, now working in industry or academia in different continents. He was elected Fellow of IEEE in 2005 and to European Academy of Sciences and Arts in 2022. He has a google h-index of 100 and is also a Clarivate™ Highly Cited Researcher.

PLENARY LECTURE SPEAKER

Prof. Tienchong Chang



PLENARY LECTURE

Solution-Guided Machine Learning for Nanofilm Indentation Mechanics

AFFILIATION

School of Mechanics and Engineering Science, Shanghai University, China

ABSTRACT

Nanoindentation is widely used to characterize nanoscale mechanical properties, but existing film-indentation models are limited to specific indenter sizes or modulus ratios. This presentation introduces knowledge–data fusion approaches, particularly solution-guided machine learning (SGML). For free-standing films, prior theoretical solutions are embedded as features to improve prediction accuracy and extrapolation. For substrate-supported films, a solution-guided neural network (SGNN) incorporating a Hertz-based solution enables reliable film-modulus extraction; based on this, a unified scaling relation is revealed, leading to a corrected scaling model and a practical indentation-response comparison protocol.

BIOGRAPHY

Tienchong Chang (张田忠) is a Professor of the School of Mechanics and Engineering Science at Shanghai University. He received his B.S. (1997) and Ph.D. (2001) in Solid Mechanics from Xi'an Jiaotong University, and was a postdoctoral fellow at Tongji University (2002–2004). He joined Shanghai University in 2004. His research focuses on micro- and nanomechanics. He established the Stick-Spiral model for analytically solving the mechanical behavior of low-dimensional materials, predicted the domino collapse phenomenon in carbon nanotubes, revealed the "edge effect" in nanoscale contact, and proposed new concepts for nanoscale actuation including stiffness gradient driving. He currently leads a research group on "AI-Driven Multiphysical Mechanics" funded by the National Natural Science Foundation of China.

PLENARY LECTURE SPEAKER

Prof. Pattabhi Ramaiah Budarapu



PLENARY LECTURE

From High-Fidelity Impact Simulation to AI-Enabled Predictive Mechanics: Accelerating the Design of Aerospace Structures

AFFILIATION

Indian Institute of Technology Bhubaneswar

ABSTRACT

High-velocity impacts such as bird and projectile strikes pose major challenges in aerospace structural design and certification. Although high-fidelity explicit finite element (FE) simulations provide detailed insight into nonlinear impact behaviour, their computational cost limits rapid design exploration and real-time assessment. An integrated framework combining high-fidelity computational mechanics and deep learning for accelerated impact analysis and design has been proposed here. The first part examines bird-strike response of hybrid aluminium-GFRP aircraft wings using a coupled SPH-FE approach. The results highlight the critical influence of impact location, velocity, and laminate architecture, and demonstrate how appropriately designed hybrid structures can improve load distribution, energy absorption, and impact resistance. The second part introduces AI-based surrogate modelling through Param2Image, which learns to map impact conditions to damage patterns and structural response. The approach enables rapid reproduction of complex impact damage and supports near-real-time design exploration, what-if analysis, and damage assessment. The final part advances from image-based prediction to mesh-based reconstruction of the complete three-dimensional response using a multi-resolution MeshGraphNet surrogate. The model predicts displacement, stress, and plastic-strain fields directly on the original FE mesh, enabling rapid and detailed interrogation of localized structural response within familiar engineering workflows. Together, these studies demonstrate a progression from physics-based simulation to AI-augmented computational mechanics, where machine learning complements rather than replaces high-fidelity numerical methods. The central vision is to transform expensive simulations into fast, field-resolved predictive tools that enable rapid design, optimization, digital twins, real-time assessment, and engineering decision-making for safer and more efficient aerospace structures.

BIOGRAPHY

P. R. Budarapu is Associate Professor in the School of Mechanical Sciences, Indian Institute of Technology Bhubaneswar. His research interests include lithium-ion batteries, photovoltaic solar cells, hybrid hierarchical cellular structures, deep machine learning and computational methods for fracture. He serves on the editorial boards of the International Journal of Computational Methods and Frontiers of Structural and Civil Engineering, and acts as reviewer for several international journals and funding agencies.

PLENARY LECTURE SPEAKER

Prof. Dr. Klaus Hackl



PLENARY LECTURE

Model-Free Data-Driven Simulation of Elasto-Plastic Materials

AFFILIATION

**Institute of Mechanics of Materials,
Ruhr University Bochum, Germany**

ABSTRACT

Data-driven computational mechanics replaces phenomenological constitutive functions by performing numerical simulations based on data sets of representative samples in stress-strain space. The distance of modeling values, e.g. stresses and strains in Gauss-points of a finite element calculation, from the data set is minimized with respect to an appropriate metric, subject to equilibrium and compatibility constraints, see [1]. Although this method operates well for non-linear elastic problems, there are challenges dealing with history-dependent materials, since one point in stress-strain space might correspond to different material behaviour. In [2], this issue is treated by including local histories into the data set. However, there is still the necessity to include models for the evolution of internal variables. Thus, a mixed formulation is obtained consisting of a combination of classical and data-driven modeling. In the presented approach, the data set is augmented with directions in the tangent space of points in stress-strain space. Moreover, the data set is classified into subsets corresponding to different material behaviour, e.g. loading, unloading, elastic and inelastic. Based on the classification, transition rules map the modeling points to the various subsets, [3]. From an application perspective, the coverage of qualified data states and calculating the corresponding tangent space is crucial. In this respect, material symmetry significantly helps to reduce the amount of necessary data. This study applies the data-driven paradigm to elasto-plasticity with isotropic hardening. We formulate our approach employing Haigh–Westergaard coordinates, providing information on the underlying material yield surface. Based on this, we use a combined tension–torsion test to cover the knowledge of the yield surface and a single tensile test to calculate the corresponding tangent space. The resulting data-driven method minimizes the distance over the Haigh–Westergaard space augmented with directions in the tangent space subject to compatibility and equilibrium constraints, [4].

References

[1] Kirchdoerfer, T., Ortiz, M. (2016). Data-driven computational mechanics. Computer Methods in Applied Mechanics and Engineering, 304, 81-101.

[2] Eggersmann, R., Kirchdoerfer, T., Reese, S., Stainier, L., Ortiz, M. (2019). Model-Free Data-Driven inelasticity. Computer Methods in Applied Mechanics and Engineering, 350, 81-99.

[3] Ciftci, K., Hackl, K. (2022). Model-free data-driven simulation of inelastic materials using structured data sets, tangent space information and transition rules. Comput. Mech., 70, 425–435.

[4] Ciftci, K., Hackl, K. (2023). Model-free data-driven inelasticity in Haigh–Westergaard space —A study how to obtain data points from measurements. Computer Methods in Applied Mechanics and Engineering, 416, 116352.

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BIOGRAPHY

Klaus Hackl is Senior Professor of Mechanics of Materials at Ruhr University Bochum. He received his PhD from RWTH Aachen and his habilitation from TU Graz, and held a Feodor Lynen fellowship at the University of Delaware. His research covers variational methods, continuum and numerical mechanics, multiscale problems, microstructures, inelasticity, phase transformations and bio/geomaterials. He directs the international master programme “Computational Engineering” and serves on the editorial boards of Continuum Mechanics and Thermodynamics, the International Journal for Computational Multiscale Engineering and other journals.

Conference Thematic Program

Afternoon Sessions · Oct 17 -18

DACOMA 2026 Engineering Symposium

Engineering Symposium on Frontiers of AI-Empowered Civil Engineering

Time	Session	Speaker	Talk Title / Details	Chair
13:30–13:40	Opening Address	Guoqiang Li	Opening remarks	Fang Liu
13:40–14:10	Plenary Talk	Timon Rabczuk	Frontiers of AI-Empowered Civil Engineering: An ESCE Perspective	
14:10–14:30	Keynote Talk	Bohayra Mortazavi	AI-Assisted First-Principles Multiscale Modeling of Advanced Materials	Zhi Sun
14:30–14:50	Keynote Talk	Ye Xia	Bridge SHM in the AI Era: A China Perspective	
14:50–15:10	Keynote Talk	Mohammad Sadegh Eshaghi	Deep Learning Method in Solving PDEs	
15:10–15:30	Keynote Talk	Yue Pan	AI-Driven Risk Assessment and Prediction in Underground Engineering	
15:30–15:45	Keynote Talk	Fang Liu	2026 Engineering Fronts in Civil, Hydraulic and Architectural Engineering	
15:45–16:00	Coffee Break			
16:00–17:30	Roundtable Discussion		Topic: Interdisciplinary Frontiers of Future Civil Engineering in the AI Era Guests: Timon Rabczuk, Zhuo Zhuang, Goangseup Zi, Elena Atroshchenko, Min Xie, Klaus Hackl, Navid Vali Zadeh	Fang Liu, Xiaoying Zhuang

Theme 05: Data-Driven Constitutive Models

Organizer: Shan Tang, Bin Ding

Oct 17 · Room 101 · 13:30–15:50 · 8 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Yue Mei** [*] Dalian University of Technology **[05 Data-Driven Constitutive Models]** *Deep Image Prior-based Reconstruction of heterogeneous Elastic Property Distribution of Solids*	
13:50–14:10	**Shan Tang** [*] Dalian University of Technology **[05 Data-Driven Constitutive Models]** *A Large Language Model-inspired Experimental-data-driven Framework for Viscoelastic Soft Structures*	
14:10–14:30	**Yiqian He** [*] Dalian University of Technology **[05 Data-Driven Constitutive Models]** *Data-driven constitutive models for biphasic hyperelasticity of soft biological tissues*	
14:30–14:50	**Yibo Wang** [*] Zhejiang University **[05 Data-Driven Constitutive Models]** *A PINN-Based Hyperelastic Constitutive Model Trained with Experimental Data*	**Bin Ding**
14:50–15:05	**Xuyang Zhang** Xi'an Jiaotong University **[05 Data-Driven Constitutive Models]** *Physics-informed temporal convolutional networks for composite constitutive modeling*	
15:05–15:20	**Henglei Quan** Xi'an Jiaotong University **[05 Data-Driven Constitutive Models]** *Transformer-Enhanced Proper Orthogonal Decomposition for Reduced-Order Multiscale Constitutive Modeling of Composites*	
15:20–15:35	**Guangyu Wang** Peking University **[05 Data-Driven Constitutive Models]** *Neural-Network-Based Nonlinear Mori-Tanaka Method for Composites with Liquid Inclusions*	
15:35–15:50	**Lvfeng Jiang** Southwest Jiaotong University **[05 Data-Driven Constitutive Models]** *Neural network-enhanced hardening laws within an implicit return mapping framework for cyclic plasticity*	

Coffee Break

Theme 11: Visualization and Analysis of Multi-source Data

Organizers: Jing Xie, Lei Wang

Theme 18: Data-Driven Dynamics and Control

Organizers: Hongbin Fang, Shu Zhang

Oct 17 · Room 101 · 16:10–17:15 · 4 presentations

Time	Speaker & Title	Chair
16:10–16:30	**Lin Wang** [*] Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences **[11 Visualization and Analysis of Multi-source Data]** *Intelligent Biomechanical Human-Machine Interaction in Rehabilitation Robots*	Jing Xie
16:30–16:45	**Zhuoyue Yang** Beijing Institute of Technology **[11 Visualization and Analysis of Multi-source Data]** *Visualization and Analyzing Multi-modal UAV Data for Building Damage Assessment*	
16:45–17:00	**AMBALIKA HALDER** RIKEN **[18 Data-Driven Dynamics and Control]** *Data-Driven Handwritten Digit Recognition Using Spin-Wave Dynamics in a Micromagnetic Reservoir*	Jing Xie

Theme 02: Data-Driven Computing and Simulation (1/2)

Organizer: Yanping Lian, Heng Hu

Oct 17 · Room 103 · 13:30–15:15 · 6 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Shaoqiang Tang** [*] Peking University **[02 Data-Driven Computing and Simulation]** *A residual-balanced Nitsche–PGD method for elliptic problems in L-shaped domains*	Heng Hu
13:50–14:10	**Yanchuan Hui** [*] Shenyang University **[02 Data-Driven Computing and Simulation]** *On the Coupling of Data-driven Computational Mechanics and Carrera Unified Formulation for the Static Analysis of Three-dimensional Composite Profile Structures*	
14:10–14:30	**Zhihao Qian** [*] Peking University **[02 Data-Driven Computing and Simulation]** *Intelligent Modeling Enabled by Meshfree Methods: Physics-Constrained Learning and Data-Driven Surrogates*	
14:30–14:45	**Lehui Li** Beijing Institute of Technology **[02 Data-Driven Computing and Simulation]** *A Physics-Structure-Aware Adaptive Discretization Learning Method for Complex Physical Fields in Impact and Penetration Problem*	
14:45–15:00	**Minghui Ma** Tianjin University **[02 Data-Driven Computing and Simulation]** *Mechanical Logic Guided Extensible Modeling of Engineering Field Data*	
15:00–15:15	**Yuhang Liu** Tongji University **[02 Data-Driven Computing and Simulation]** *A Meshfree Physics-Informed Neural Network Framework for Topology Optimization with Implicit Sensitivity Analysis*	
Coffee Break		

Theme 02: Data-Driven Computing and Simulation (2/2)

Organizer: Yanping Lian, Heng Hu

Oct 17 · Room 103 · 15:30–17:10 · 6 presentations

Time	Speaker & Title	Chair
15:30–15:50	**Yilin Guo**[*] Dalian University of Technology **[02 Data-Driven Computing and Simulation]** *PIML-OFEM: A New Large-scale Structural Analysis Method Based on Problem Independent Machine Learning and Overlapping Finite Element Technique*	Yanping Lian
15:50–16:10	**Fanbo Xiang**[*] Sudo, Shanghai **[02 Data-Driven Computing and Simulation]** *Geometric Processing for Robotics Simulation*	
16:10–16:25	**Muxi Li** Tianjin University **[02 Data-Driven Computing and Simulation]** *Deep Learning-Based Rapid Prediction of Hemodynamic Parameters in Type B Aortic Dissection*	
16:25–16:40	**You Zhou** Peking University **[02 Data-Driven Computing and Simulation]** *An Efficient Surrogate Model for Large-Scale Fluid Simulations Based on Dimensionality Reduction and Fast Function Extraction*	
16:40–16:55	**Kaiyang Zhao** Tongji University **[02 Data-Driven Computing and Simulation]** *A Fusion of Data-Driven and Uncertainty Modelling for 3D Compressive Strength Prediction of Concrete: Multi-factor Coupling Analysis and Explainability Study*	
16:55-17:10	**Wenjing Ye** Tongji University **[02 Data-Driven Computing and Simulation]** *Beyond empirical correlations: physics-informed discovery of gas holdup formulas for subsea gas leakage*	

Theme 07: ML-Based Metamaterials and Advanced Materials Design (1/2)

Organizer: Qinglei Zeng, Xiang Li

Oct 17 · Room 205 · 13:30–15:25 · 6 presentations

Time	Speaker & Title	Chair
13:30–13:50	**Chenxu Liu** [*] Beijing University of Technology **[07 ML-Based Metamaterials and Advanced Materials Design]** *Machine learning-based inverse design of phononic metamaterials*	Qinglei Zeng
13:50–14:10	**Yanwei Liu** [*] Beihang University **[07 ML-Based Metamaterials and Advanced Materials Design]** *Mechanical behavior prediction and inverse design of biomimetic composites*	
14:10–14:30	**Yafeng Chen** [*] Tongji University **[07 ML-Based Metamaterials and Advanced Materials Design]** *Deep Learning Empowered Multiband Three-Dimensional Higher-Order Acoustic Topological Insulator*	
14:30–14:45	**Qiong Liu** Institute of Computational Mechanics × AI & College of Intelligent Robotics and Advanced Manufacturing, Fudan University **[07 ML-Based Metamaterials and Advanced Materials Design]** *Engineering Flexoelectric Response in Low-Dimensional van der Waals Materials*	
14:45–15:00	**Jianqiao Song** Dalian University of Technology **[07 ML-Based Metamaterials and Advanced Materials Design]** *Design of Mechanical Cloaking for Large-Scale Structures via Problem-Independent Machine Learning (PIML)*	
15:00–15:15	**Xinyue Wu** Tongji University **[07 ML-Based Metamaterials and Advanced Materials Design]** *Experiment on Gradient Pillared Metastructures for Broadband Surface Wave Isolation in Sandy Soil*	
Coffee Break		



Theme 07: ML-Based Metamaterials and Advanced Materials Design (2/2)

Organizer: Qinglei Zeng, Xiang Li

Oct 17 · Room 205 · 15:45–16:20 · 3 presentations

Time	Speaker & Title	Chair
15:35-15:50	**Xuan Zheng** Tongji University [07 ML-Based Metamaterials and Advanced Materials Design] *Elastic surface wave attenuation in layered soils by metastructures*	Xiang Li
15:50–16:05	**Xiao Ding** Shandong University of Technology [07 ML-Based Metamaterials and Advanced Materials Design] *Size-dependent bending, vibration and buckling analysis of porous functionally graded material microbeam using Back-propagation neural network and classical couple stress theory*	
16:05–16:20	**Li Xiang** Hainan Normal University [07 ML-Based Metamaterials and Advanced Materials Design] *Differentiable inverse design of phononic crystals with prescribed bandgaps in an implicit geometry space*	

Theme 03: Digital Twin Modeling and Uncertainty Design

Organizer: Peng Hao, Qi Tong, Xiangyun Long, Hao Yang

Oct 17 · Room 206 · 13:30–15:40 · 7 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Weizhe Wang** [*] Shanghai Jiao Tong University **[03 Digital Twin Modeling and Uncertainty Design]** *Physics- and Extremely-Sparse-Observation-Informed Digital Twin for Thermo-Mechanical Behavior of High-Temperature, High-Pressure, High-Speed Multi-Component Structures*	Qi Tong
13:50–14:10	**Shaojun Feng** [*] Dalian University of Technology **[03 Digital Twin Modeling and Uncertainty Design]** *Inverse Calibration with Adaptive Similarity Learning for Field-Regulated Design*	
14:10–14:30	**Zunyi Duan** [*] Northwestern Polytechnical University **[03 Digital Twin Modeling and Uncertainty Design]** *Multi-scale Variable Stiffness Reliability-based Topology Design Optimization of Fiber Reinforced Composites*	
14:30–14:50	**Long Chen** [*] University of Shanghai for Science and Technology **[03 Digital Twin Modeling and Uncertainty Design]** *3D isogeometric shape optimization of complex structures considering C1 continuity and unimodal constraints*	
14:50–15:10	**Di Zhou** [*] Donghua University **[03 Digital Twin Modeling and Uncertainty Design]** *Multi-source Data-driven Prediction of Equipment Lifetime Uncertainty and Digital Twin Model Construction*	
15:10–15:25	**Zhiyuan Ma** Hohai University **[03 Digital Twin Modeling and Uncertainty Design]** *LMM-DPIM-based neural network model for the efficient stochastic shakedown and reliability analyses of printed circuit heat exchangers*	
15:25–15:40	**Junjie Diao** Dalian University of Technology **[03 Digital Twin Modeling and Uncertainty Design]** *Generative Design and Reliability Optimization of Aerospace Cellular Structures*	

Coffee Break

Theme 16: Design Generative AI, LLM, and agentic AI for mechanics and engineering

Organizer: Haifei Zhan, Zheliang Wang

Oct 17 · Room 206 · 16:00–16:45 · 3 presentations



Time	Speaker & Title	Chair
16:00–16:15	**Haodong Jiang** Institute of Mechanics, CAS **[16 Design Generative AI, LLM, and agentic AI for mechanics and engineering]** *KeLiAgent: A Full-Pipeline Research Agent for Scaling-Law Extraction in Mechanics*	**Zheliang Wang**
16:15–16:30	**Haoran Pan** Peking University **[16 Design Generative AI, LLM, and agentic AI for mechanics and engineering]** *FoamCraft: Specification-Driven Development and Numerical Evaluation of OpenFOAM Solver Extensions*	
16:30–16:45	**Zheliang Wang** Fudan University **[16 Design Generative AI, LLM, and agentic AI for mechanics and engineering]** *AIDE: End-to-end agentic AI for inverse structural design of stretchable electronics*	

Theme 14 : Machine Learning Computing for Damage and Fracture Mechanics

Organizers: Yizheng Wang, Jinshuai Bai



Oct 17 · Room 208 · 13:30–15:20 · 6 presentations

Time	Speaker & Title	Chair
13:30–13:50	**Haolin Li** [*] Imperial College London [14 Machine Learning Computing for Damage and Fracture Mechanics] *Operator Learning for Solid Mechanics*	
13:50–14:10	**Qian SHAO** [*] Wuhan University [14 Machine Learning Computing for Damage and Fracture Mechanics] *A Physics-Informed Neural Network with Discontinuity Embedding and Local Enhancement for Fracture Mechanics*	**Yizheng Wang**
14:10–14:30	**Xiangyun Long** [*] Hunan University [14 Machine Learning Computing for Damage and Fracture Mechanics] *An AI-Fracture Mechanics Integrated Framework for Intelligent Structural Damage Assessment*	
14:30–14:50	**Peng Zhang** [*] Tongji University [14 Machine Learning Computing for Damage and Fracture Mechanics] *Deep Energy Methods for Phase-Field Fracture and Their Multiphysics Extensions*	
14:50–15:05	**Yizheng Wang** Tsinghua university in Beijing [14 Machine Learning Computing for Damage and Fracture Mechanics] *Extended Deep Energy Method (XDEM)*	**Jinshuai Bai**
15:05–15:20	**Jiancong Wen** Shenzhen Institute for Advanced Study, UESTC [14 Machine Learning Computing for Damage and Fracture Mechanics] *Physics-Informed Neural Network-Based Topology Optimization of Cracked Structures*	
	Coffee Break	



Theme 15: ML for Inverse Problems and Uncertainty Quantification

Organizers: Xinquan Huang, Yuanyuan Li

Oct 17 · Room 208 · 15:30–17:15 · 6 presentations

Time	Speaker & Title	Chair
15:30–15:50	**Xuhui Meng** [*] Huazhong University of Science and Technology **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *Flow-based generative models for amortized Bayesian inference in regression and inverse PDE problems*	
15:50–16:10	**Jiaze He** [*] Harbin Institute of Technology **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *Deep Learning for Computational Ultrasound Imaging and Stress Inversion*	**Xinquan Huang**
16:10–16:30	**Bowu Jiang** [*] Beijing University of Chemical Technology **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *Anisotropy-Aware Physics-Informed Neural Network for Acoustic Emission Source Localization in CFRP Laminates*	
16:30–16:45	**Weizhe Wang** Shanghai Jiao Tong University **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *Identification of Clamping Contact Regions from Local Displacement Observations*	
16:45–17:00	**Zhaoyang Chen** Shanghai Jiao Tong University **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *A Multigrid Iterative Neural Operator with Gradient Constraints for Single-Sample Reconstruction of Turbine Blade Film-Cooling Fields*	**Yuanyuan Li**
17:00–17:15	**Pengjie Xue** China University of Petroleum (East China) **[15 ML Methods for Inverse Problems and Uncertainty Quantification]** *Physics-Constrained Generative Learning for Seismic Inverse Problems and Uncertainty Quantification*	

Theme 06: Machine Learning-Based Partial Differential Equations

Organizer: Xiaoying Zhuang, Zhuojia Fu

Oct 18 · Room 101 · 13:30–15:40 · 8 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Elena Atroshchenko** [*] University of New South Wales **[06 Machine Learning-Based PDE]** *A mesh-free deep energy discretization for phase-field fracture under mechanical and thermal loading*	Xiaoying Zhuang
13:50–14:10	**Jinshuai Bai** [*] Tsinghua University **[06 Machine Learning-Based PDE]** *Intelligent Computational Mechanics: From Physics-Informed Neural Networks to Discrete Solution Operator Learning*	
14:10–14:25	**Hongquan Wang** Hohai University **[06 Machine Learning-Based PDE]** *Hybrid Quantum–Classical Neural Networks for Efficient Scientific Computing*	
14:25–14:40	**Tao Zhang** Hohai University **[06 Machine Learning-Based PDE]** *Hard-Constrained Physics-Informed Neural Networks with Asymptotic Factorization for Unbounded Wave Problems*	
14:40–14:55	**Xin Li** Hunan University **[06 Machine Learning-Based PDE]** *Physics-Informed Data Fusion Deep Learning for Multiphysics Thermoelastic Modeling*	Zhuojia Fu
14:55–15:10	**Arindam Nath** Harbin Institute of Technology **[06 Machine Learning-Based PDE]** *A Physics-Informed Neural Network Method for Nonlocal Vibration of Piezoelectric Nanobeams*	
15:10–15:25	**Shizhou Luo** Shanghai Jiao Tong University **[06 Machine Learning-Based PDE]** *SplineNet: An Isogeometric Deep Learning Method for Complex Shells*	
15:25–15:40	**Zhuojia Fu** Hohai University **[06 Machine Learning-Based PDE]** *Intelligent Computational Mechanics Based on Radial Basis Function*	

Coffee Break

Theme 04: Data-Driven Engineering Applications

Organizer: Jian Xiong, Chengwei Fei

Oct 18 · Room 101· 16:00–17:10 · 4 presentations

Time	Speaker & Title	Chair
16:00–16:20	**Wenwang Wu**[*] Suzhou National Laboratory **[04 Data-Driven Engineering Applications]** *Construction of Multimodal Databases for Several Types of Alloy Materials and Examples of Intelligent R&D Applications*	**Chengwei Fei**
16:20–16:40	**Shikeng Zhao** [*] Chongqing University **[04 Data-Driven Engineering Applications]** *Deep-Learning-Based Finger-Tap Localization for Panel-like Structures*	
16:40–16:55	**Mengyao Xing** Wuhan University of Technology **[04 Data-Driven Engineering Applications]** *Reproduction, Deployment and Failure Analysis of a LBM-based Data-Driven Tracker for Underwater Dynamic Targets*	
16:55-17:10	**Mengjie Li** Peking University **[04 Data-Driven Engineering Applications]** *Spatiotemporal Reconstruction of Wind Turbine Wakes Based on Physics-Informed Neural Networks and LiDAR*	



Theme 17: Data-Driven Comput. Methods for Infrastruct. Analysis under Uncertainty

Organizers: Yi Luo, Decheng Feng

Oct 18 · Room 102 · 13:30–15:10 · 6 presentations

Time	Speaker & Title	Chair
13:30–13:50	**Shizhi Chen** [*] Chang'an University **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Magnetic Sensing based Rebar Localization and Probabilistic Corrosion Assessment in Reinforced Concrete Structures*	**Yi Luo, Decheng Feng**
13:50–14:10	**Yan Shi** [*] City University of Hong Kong **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Machine Learning Technique for Prediction and Uncertainty Quantification of Engineering Systems*	
14:10–14:25	**Yi Luo** Leibniz University Hannover **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Physics-Enhanced Data-Assisted Stochastic Analysis of Vehicle-Railway-Bridge Systems via Dimension-Reduced Probability Density Evolution Equation (DR-PDEE)*	
14:25–14:40	**Yuxiao Wu** Southeast University **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Data-Driven Uncertainty Quantification and Safety Assessment of Prestressed Concrete Containment Vessels*	
14:40–14:55	**Lili Weng** Fujian Agriculture and Forestry University **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Probabilistic reconstruction of unmeasured structural responses via decoupled probability density evolution*	
14:55–15:10	**Meng-Ze Lyu** Leibniz University Hannover **[17 Data-Driven Computational Methods for Infrastructure Analysis under Uncertainty]** *Integration-free probabilistic modeling for infrastructure fragility: A rapid data-driven framework*	

Theme 19: Physics-Informed ML for Reduced-Order Modeling (1/2)

Organizers: Jinlong Fu, Dunhui Xiao

Oct 18 · Room 103 · 13:30–15:30 · 6 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Yongjin Zhang** [*] Henan Polytechnic University **[19 Physics-Informed ML for Reduced-Order Modeling]** *Integrated adaptive Physics-informed neural networks for solving partial differential equations*	Jinlong Fu
13:50–14:10	**Rui Fu**[*] Tongji University **[19 Physics-Informed ML for Reduced-Order Modeling]** *Data-driven Non-Intrusive Reduced-Order Modelling*	
14:10–14:30	**Chunyu Zhang** [*] Sun Yat-Sen University **[19 Physics-Informed ML for Reduced-Order Modeling]** *Model Order Reduction for Practical Nonlinear Simulations: From Solid Viscoplasticity to Thermal-Hydraulics*	
14:30–14:50	**Dunhui Xiao** [*] School of Mathematical Sciences, Tongji University **[19 Physics-Informed ML for Reduced-Order Modeling]** *Parametric Probabilistic Manifold Decomposition for Nonlinear Model Reduction*	
14:50–15:10	**Xiang Sun** [*] Ocean University of China **[19 Physics-Informed ML for Reduced-Order Modeling]** *Physics-Informed Reduced-Order Modeling for Retrieving the Ocean Interior Density From the Surface*	
15:10–15:30	**Qian Wang** [*] Beijing Computational Science Research Center **[19 Physics-Informed ML for Reduced-Order Modeling]** *Physics-aware training of reduced-order models for unsteady flows*	
	Coffee Break	



Theme 19: Physics-Informed ML for Reduced-Order Modeling (2/2)

Organizers: Jinlong Fu, Dunhui Xiao

Oct 18 · Room 103 · 15:50–17:35 · 6 presentations

Time	Speaker & Title	Chair
15:50–16:10	**Kangli Xu** [*] Xi'an Jiaotong University [19 Physics-Informed ML for Reduced-Order Modeling] *An Enhanced Non-Intrusive Reduced-Order Model for Parametric Nonlinear Systems with Dynamic Mode Decomposition and Groupwise Interpolation on Riemannian Manifolds*	Dunhui Xiao
16:10–16:30	**Yinghao Nie** [*] Dalian University of Technology [19 Physics-Informed ML for Reduced-Order Modeling] *A data-driven concurrent multiscale FE-FCA method for the elastoplastic nonlinear mechanical response analysis and topology optimization of large-scale composite structures*	
16:30–16:50	**Nan Deng** [*] Harbin Institute of Technology, Shenzhen [19 Physics-Informed ML for Reduced-Order Modeling] *Physics-Aware Cluster-Based Reduced-Order Modeling and Control for Nonlinear Dynamics*	
16:50–17:05	**Keyu Xu** Beijing Computational Science Research Center [19 Physics-Informed ML for Reduced-Order Modeling] *A Mori-Zwanzig-Inspired Neural Closure for Domain-Decomposed ROMs of Coupled Physical Systems*	
17:05–17:20	**Mengxi Zhang** Tianjin University [19 Physics-Informed ML for Reduced-Order Modeling] *An Energy-Adaptive Gaussian Process Method for Full-Field and Full-Time Domain Seismic Response Prediction of Concrete Dams*	
17:20–17:35	**Dongwei Ye** Xi'an Jiaotong-Liverpool University [19 Physics-Informed ML for Reduced-Order Modeling] *Data-driven reduced-order modelling for hemodynamic simulations with geometry-informed snapshots*	

Theme 08: Data-Driven Techniques in Multi-Scale Multi-Physics Simulation (1/2)

Organizers: Huadong Yong, Jia Li



Oct 18 · Room 205 · 13:30–15:35 · 7 presentations

Time	Speaker & Title	Chair
13:30–13:50	**Hongfei Ye**[*] Dalian University of Technology **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Efficient Physics-Constrained Learning for Two-Phase Interfacial Dynamics Using Smoothing Kernel Gradients*	
13:50–14:10	**Ruifeng Hu**[*] Lanzhou University **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Assessment of Data-Driven Methods for Autoregressive Spatiotemporal Prediction of Turbulent Flows*	
14:10–14:30	**Xuefeng Tang** [*] Huazhong University of Science and Technology **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Multi-scale surrogate model of crystal plasticity under complex loading conditions*	
14:30–14:50	**Fusheng Tan**[*] Hefei University of Technology **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Data-inspired atomic environment-dependence of vacancy formation energy in high-entropy alloys*	**Jia Li**
14:50–15:05	**Jiefei Zhang** China University of Geosciences (Wuhan) **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *From Hydraulic Disturbance to Long-Term Deformation: Slip Zone Softening, Time-Varying Response, and Impulse Accumulation in Reservoir Landslides*	
15:05–15:20	**Qingkun Zhao** Zhejiang University **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *AI-Powered Visualization of Invisible Mechano-Information: Stress, Defects, and Beyond*	
15:20–15:35	**Shuo Wang** Hunan University **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Dislocation Dynamics of Irradiated High-Entropy Alloys: Role of Lattice Heterogeneity and Dispersed Oxide Nanoparticles in Defect Evolution and Damage*	

Coffee Break



Theme 08: Data-Driven Techniques in Multi-Scale Multi-Physics Simulation (2/2)

Organizers: Huadong Yong, Jia Li

Oct 18 · Room 205 · 15:50–16:35 · 3 presentations

Time	Speaker & Title	Chair
15:50–16:05	**Dongming An** Hohai University **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Physics-Informed Machine Learning-Driven Constitutive Discovery for High-Temperature Superconductors*	
16:05–16:20	**Xiaoai Yi** Hunan University **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Phase field crystal simulation of dynamic grain boundary evolution at different temperatures*	**Jia Li**
16:20–16:35	**Libo Yu** State Key Laboratory of Advanced Design and Manufacturing Technology for Vehicle, College of Mechanical and Vehicle Engineering, Hunan University, Changsha, 410082, PR China **[08 Data-Driven Techniques in Multi-Scale Multi-Physics Simulation]** *Phase-field modeling of stress corrosion cracking in multi-principal-element alloys*	

Theme 10: Data-Driven Design and Optimization

Organizers: Hongling Ye, Zhi Sun

Oct 18 · Room 206 · 13:30–15:30 · 7 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Xingyu Zhang** [*] Beijing University of Technology **[10 Data-Driven Design and Optimization]** *Data-based Design Strategy of Short-fiber Reinforced Hydrogel for Target Deformation Fields*	
13:50–14:10	**Hongling Ye** [*] Beijing University of Technology **[10 Data-Driven Design and Optimization]** *Data-driven Topology Optimization Design for continuous fiber-reinforced composite structure*	
14:10–14:30	**Pin Wen** [*] Wuhan University of Technology **[10 Data-Driven Design and Optimization]** *Data-driven multi-objective material and shape optimization of tridirectional functionally graded structures in thermal environments*	
14:30–14:45	**Yongfeng Cheng** Wuhan University of Technology **[10 Data-Driven Design and Optimization]** *A Data-Driven Design Optimization Framework for T-foils via Adaptive Sampling Kriging*	**Hongling Ye**
14:45–15:00	**Shengbiao Lu** Shanghai Jiao Tong University **[10 Data-Driven Design and Optimization]** *eCNNTO: A Highly Generalizable ConvNet for Accelerating Topology Optimization*	
15:00–15:15	**Tianju Xue** Hong Kong University of Science and Technology **[10 Data-Driven Design and Optimization]** *Physics-Guided Diffusion Models for Design of Disordered Mechanical Metamaterials*	
15:15–15:30	**Shaolei Zhang** Zhejiang University **[10 Data-Driven Design and Optimization]** *Data-Driven Predictive Design of Voxelized Liquid Crystal Elastomer Plates for Three-Dimensional Shape Morphing*	

Coffee Break

Theme 10: Data-Driven Design and Optimization

Organizers: Hongling Ye, Zhi Sun

Theme 12: Intelligent Methods for Engineering Systems

Organizers: Yufeng Huang, Hongwei Guo

Oct 18 · Room 206 · 15:45–17:05 · 5 presentations

Time	Speaker & Title	Chair
15:45–16:00	**Mingxuan Xu** Beijing University of Technology **[10 Data-Driven Design and Optimization]** *Automatic Segmentation of Vascular Media and Lumen in IVUS Images Based on PGD-U Net*	**Zhi Sun**
16:00–16:15	**Xiaohui Song** Hefei University of Technology **[10 Data-Driven Design and Optimization]** *Quantitative Mapping of CTAB-Directed Mesoporous Silica Morphology Evolution via Machine Learning and In-situ Electron Microscopy*	
16:15–16:35	**Huilong Ren** [*] Tongji University **[12 Intelligent Methods for Engineering Systems]** *Structure-Preserving Data-Driven Modeling of Irreversible Multiphysics Systems through a Path-Dependent Entropic Lagrangian*	**Yufeng Huang**
16:35–16:50	**Bokai Liu** Umea University Sweden **[12 Intelligent Methods for Engineering Systems]** *Learning-Based and Predictive Control for PCM-Assisted Cooling in HPC Data Centers*	
16:50–17:05	**Yuheng Zhang** Shanghai Jiao Tong University **[12 Intelligent Methods for Engineering Systems]** *Reduced-Order Ensemble Data Assimilation Framework for Predicting Thermal Deformation of Lithography Masks*	

Theme 09: Data-Driven Techniques for Continuous and Discrete Methods
Organizers: Dan Huang, Yile Hu

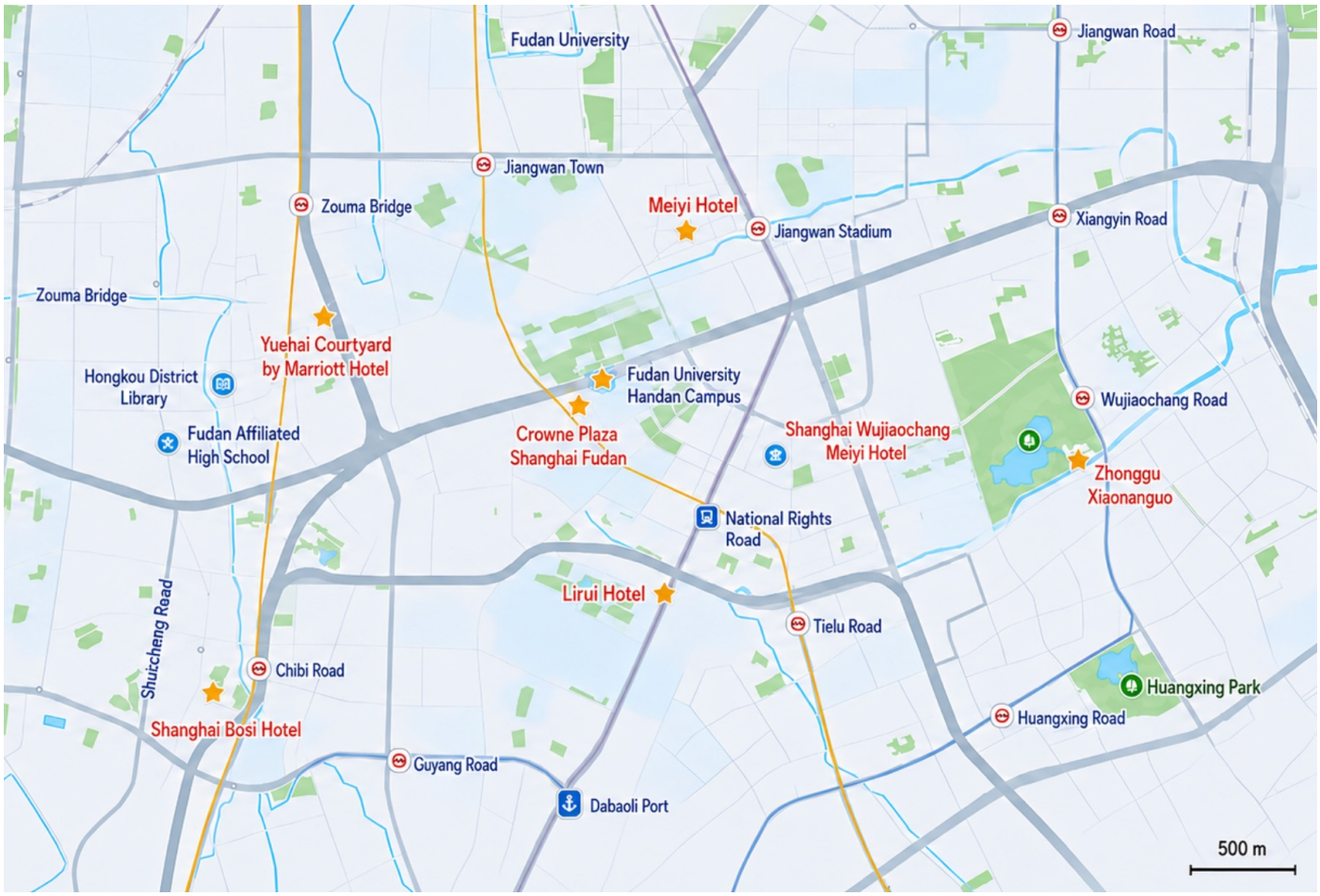
Oct 18 · Room 208 · 13:30–15:45 · 8 presentations



Time	Speaker & Title	Chair
13:30–13:50	**Weizhe Wang** [*] Shanghai Jiao Tong University [09 Data-Driven Techniques for Continuous and Discrete Methods] *Data-Driven Model Reduction Method with Adaptive Partitioning for Peridynamic Fracture Analysis*	Dan Huang, Yile Hu
13:50–14:10	**Weidong Yang** [*] Tongji University [09 Data-Driven Techniques for Continuous and Discrete Methods] *Hybrid Data-Physics Driven Intelligent Prediction for Curing Deformation in Composites*	
14:10–14:30	**Xin Lai** [*] Wuhan University of Technology [09 Data-Driven Techniques for Continuous and Discrete Methods] *Research on Optimization of Prestressed Metal-Ceramic Interpenetrating Structures Based on Machine Learning*	
14:30–14:45	**Tihan Fu** Tongji University [09 Data-Driven Techniques for Continuous and Discrete Methods] *An incompressible SPH model with coupled background mesh for simulating free surface flow*	
14:45–15:00	**Can Yi** Tongji University [09 Data-Driven Techniques for Continuous and Discrete Methods] *Efficient surrogate model for jet penetration based on graph neural networks*	
15:00–15:15	**Jiawen Wang** Tongji University [09 Data-Driven Techniques for Continuous and Discrete Methods] *PINN-Enhanced Multiresolution Modeling of Coupled Flow–Reaction Processes in Pore-Scale MICP*	
15:15–15:30	**Ghufranullah khan** Shanghai jiao tong university [09 Data-Driven Techniques for Continuous and Discrete Methods] *Physics-Informed Neural Networks for Predicting the Flexural and Shear Behavior of GFRP Reinforced Concrete Beams*	
15:30–15:45	**Yile Hu** Shanghai Jiao Tong University [09 Data-Driven Techniques for Continuous and Discrete Methods] *Image-Driven Crack Geometry Inference via Local Continuity–Discontinuity Model Comparison*	

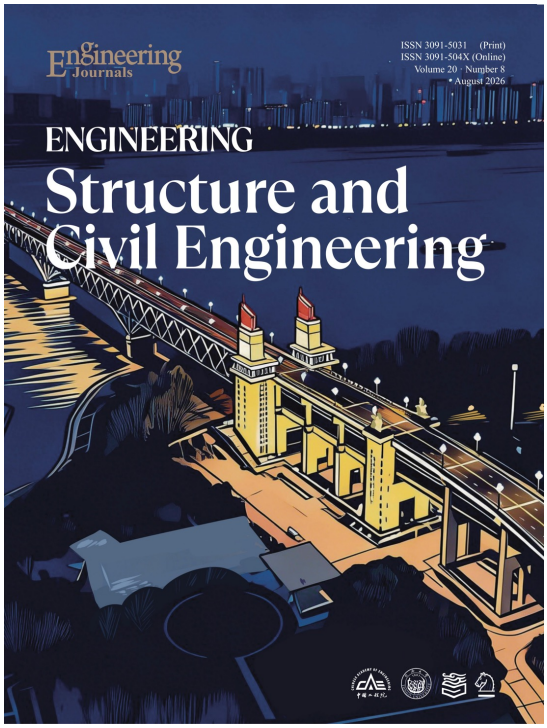
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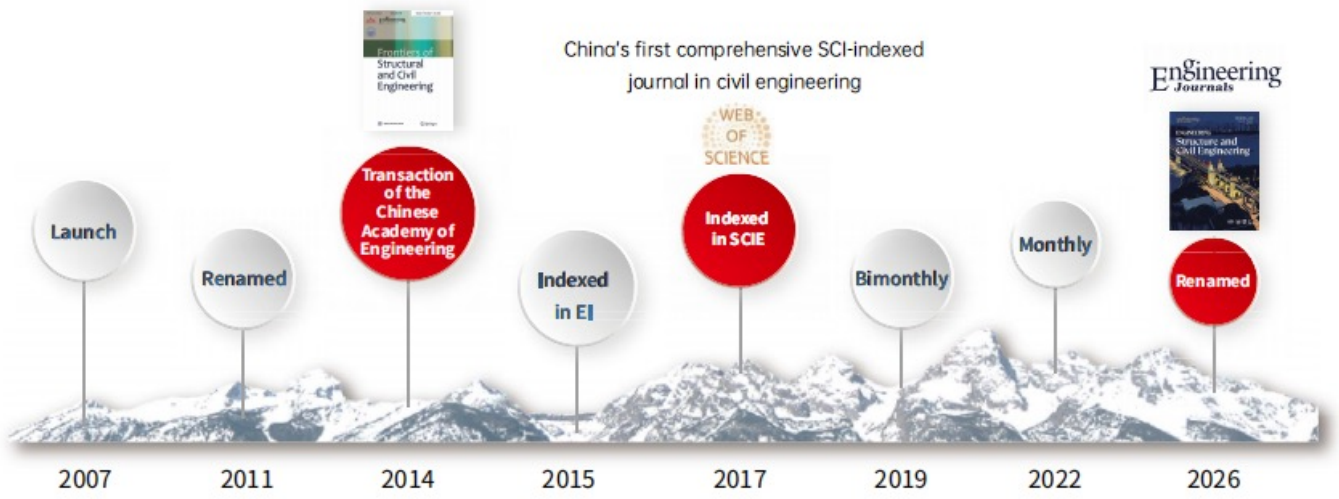
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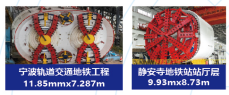
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