



浙江大学
ZHEJIANG UNIVERSITY



CSTAM
中国力学学会

RANM2025

Sixth International Conference on Recent Advances in Nonlinear Mechanics

24–28 October 2025, Hangzhou, China

Program

Hosts

Zhejiang University

The Chinese Society of Theoretical and Applied Mechanics

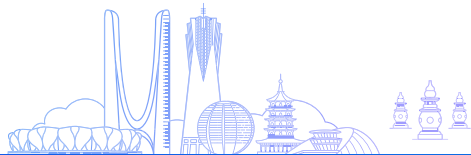
Co-organisers

School of Aeronautics and Astronautics, Zhejiang University

School of Intelligent Manufacturing and Energy Engineering,
Zhejiang University of Science and Technology

Key Laboratory of Impact and Safety Engineering, Ministry of Education, Ningbo University





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RANM2025 Handbook

The 6th International Conference on Recent Advances in Nonlinear Mechanics

24-28 October, 2025

Hangzhou, China

Chairs:

Guoxing Lu, Zhejiang University, China

Weiqiu Chen, Zhejiang University, China

Kwong Ming Tse, Swinburne University of Technology, Australia

Marian Wiercigroch, University of Aberdeen, UK

Conference Organization

Conference Hosts

Zhejiang University, China

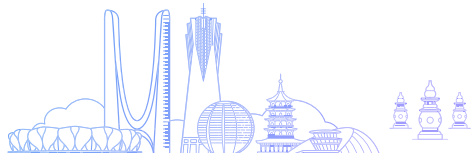
Solid Mechanics Committee, The Chinese Society of Theoretical and
Applied Mechanics (CSTAM), China

Conference Organizers

School of Aeronautics and Astronautics, Zhejiang University, China

School of Intelligent Manufacturing and Energy Engineering, Zhejiang
University of Science and Technology, China

Key Laboratory of Impact and Safety Engineering of the Ministry of
Education, Ningbo University, China



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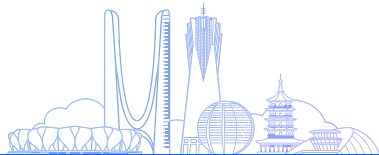
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RANM2025

Sixth International Conference on Recent Advances
in Nonlinear Mechanics





Welcome Message

Dear Colleagues and Friends,

We are delighted to extend our heartfelt welcome to the 6th International Conference on Recent Advances in Nonlinear Mechanics (RANM2025), which is hosted by Zhejiang University (ZJU) in Hangzhou, China from 24th to 28th October, 2025.

The RANM conference series has been founded by Marian Wiercigroch and its first one was held in August 2005 at the University of Aberdeen, UK. The second RANM was organized in Kuala Lumpur, Malaysia, in August 2009 by Ko-Choong Woo of the University of Nottingham, while the third RANM was held in Harbin in January 2014, and organized by Qingjie Cao at Harbin Institute of Technology, China. In May 2019, the fourth RANM took place in Lodz, Poland, and was hosted by Lodz University of Technology. The fifth RANM was held in a hybrid mode in Hangzhou, China, in October 2022, and organized by Weiqiu Chen at Zhejiang University. This one, held again in Hangzhou, is to make up for a full face-to-face RANM, and it is organized by the School of Aeronautics and Astronautics, Zhejiang University, with joint support from the School of Intelligent Manufacturing and Energy Engineering, Zhejiang University of Science and Technology, and the Key Laboratory of Impact and Safety Engineering, Ministry of Education, Ningbo University.

The RANM conference series provides a global platform for researchers to share insights, discuss recent developments, and explore new ideas in nonlinear mechanics. The conference's subjects also reflect multidisciplinary studies on contemporary approaches in a variety of technological fields. Throughout the conference, researchers will present captivating plenary lectures, keynote addresses, technical presentations and posters.

We would like to express our deep appreciations to each member of the Organizing Committee, the International Scientific Committee, mini-symposium organizers and all other supporters.

Finally, we want to express our gratitude for your valuable contributions to the RANM2025. We are delighted with your participations and are looking forward to your continued support for future RANM conferences.

RANM2025 Chairmen:

Guoxing Lu
Weiqiu Chen
Kwong Ming Tse
Marian Wiercigroch



Conference Information

◆Conference Venue

Venue: Hangzhou Lakeview Hotel

Address: No.2 Huancheng Xi Road, Gongshu District, Hangzhou

◆Registration

The registration desk will be open at the lobby of Hangzhou Lakeview Hotel during:

24th October 2025: 12:00 – 20:00

25th October 2025: 08:00 – 18:00

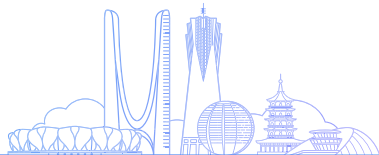
26th October 2025: 08:00 – 18:00

27th October 2025: 08:00 – 18:00

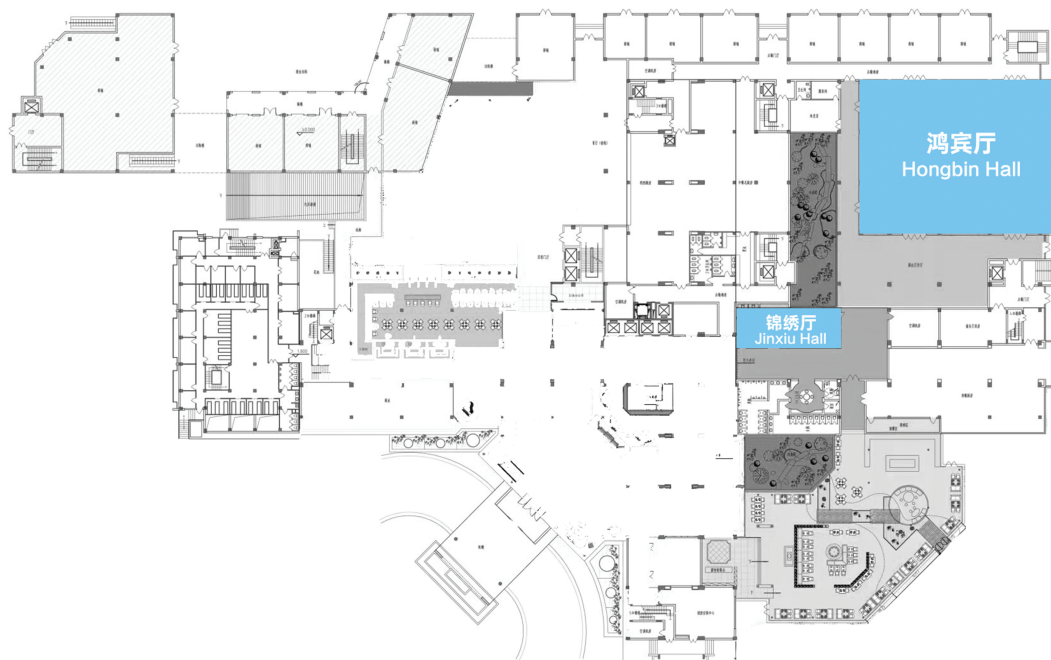
◆Catering

Date	Time	Place
24 th October	18:00 - 20:00 (Dinner)	Ground Floor, Solmer Western Restaurant
25 th October	12:40 - 13:50 (Lunch)	Ground Floor, Solmer Western Restaurant
	18:00 - 20:00 (Dinner)	Ground Floor, Solmer Western Restaurant
26 th October	12:40 - 13:50 (Lunch)	Ground Floor, Solmer Western Restaurant
	18:30 - 20:30 (Banquet)	Ground Floor, Hongbin Hall
27 th October	12:10 - 13:10 (Lunch)	Ground Floor, Solmer Western Restaurant
	18:00 - 20:00 (Dinner)	Ground Floor, Solmer Western Restaurant

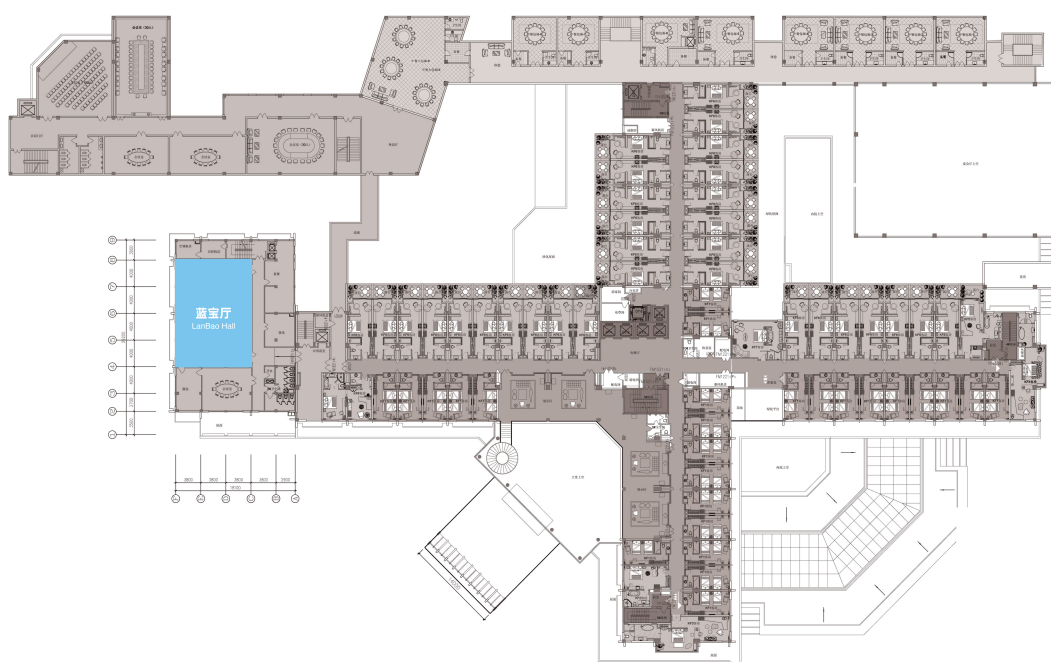
Please bring along your meal voucher.



Floor Maps of Hangzhou Lakeview Hotel



首层平面图
Level 1



二层平面图
Level 2



Organization Committees

Chairs:

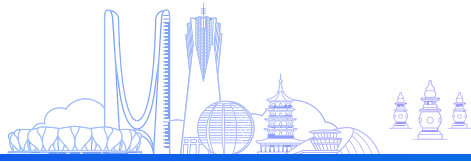
Guoxing Lu	Zhejiang University, China
Weiqiu Chen	Zhejiang University, China
Kwong Ming Tse	Swinburne University of Technology, Australia
Marian Wiercigroch	University of Aberdeen, UK

Local Organizing Committee:

Xi Zhang (Chair)	Zhejiang University of Science and Technology
Yong Gan (Co-Chair)	Zhejiang University
Guannan Wang	Zhejiang University
Bin Wu	Zhejiang University
Rui Xiao	Zhejiang University
Chunli Zhang	Zhejiang University

International Scientific Committee:

Alfred Akisanya (Aberdeen)	Miha Boltezar (Ljubljana)
Tadeusz Burczynski (Warsaw)	Qingjie Cao (Harbin)
Guanrong Chen (Hong Kong)	Weiqiu Chen (Hangzhou)
Yan Chen (Tianjin)	Vikram Deshpande (Cambridge)
Michael Gillchrist (Dublin)	Irina Goracheva (Moscow)
Sayan Gupta (Madras)	Han Huang (Shenzhen)
Zhilong Huang (Hangzhou)	Mike Jeffreys (Bristol)
Xiaoting Jing (Hong Kong)	Tomasz Kapitaniak (Lodz)
Edwin Kreutzer (Hamburg)	Anton Krivtsov (St Petersburg)
Heow Pueh Lee (Singapore)	Stefano Lenci (Ancona)
Maolin Liao (Beijing)	Yang Liu (Exeter)



Guoxing Lu (Hangzhou)

Ganwei Luo (Langzhou)

Emil Manoach (Sofia)

Carlos Mazzilli (Sao Paulo)

Vladimir Nikora (Aberdeen)

Lijun Pei (Zhengzhou)

Giuseppe Rega (Rome)

Pedro Ribeiro (Porto)

Rafal Rusinek (Lublin)

Marcelo Savi (Rio de Janeiro)

Tong-Earn Tay (Singapore)

Vahid Vaziri (Aberdeen)

Jianfei Wang (Beijing)

Quan Wang (Shantou)

Yu Wang (Harbin)

Marian Wiercigroch (Aberdeen)

Yubin Wu (Xiamen)

Bo Yan (Hangzhou)

Dixiong Yang (Dalian)

Shaopu Yang (Shijiazhuang)

Liangchi Zhang (Shenzhen)

Kun Zhou (Singapore)

Weiqiu Zhu (Hangzhou)

Tianjian Lu (Nanjing)

Lifeng Ma (Xi'an)

Jize Mao (Harbin)

John Mottershead (Liverpool)

Ekaterina Pavlovskaia (Aberdeen)

Przemysław Perlikowski (Lodz)

Yiru Ren (Changsha)

Xiaoting Rui (Nanjing)

Sunetra Sarkar (Chennai)

Janko Slavic (Ljubljana)

Michael Thompson (Cambridge)

Pankaj Wahi (Kanpur)

Morgan Wang (Beijing)

Yanqing Wang (Shenyang)

Zizhen Wang (Qingdao)

Ko-Choong Woo (Kuala Lumpur)

Jian Xu (Shanghai)

Yao Yan (Chengdu)

Jian Yang (Ningbo)

Jing Yao (Yanshan University)

Yonghao Zhang (Beijing)

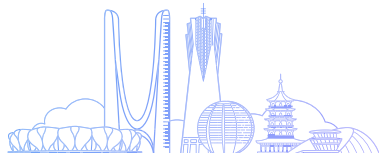
Feng Zhu (Baltimore)



Program Overview

24th October 2025, Friday, Day 0

Time	Event	Details	Chair	Venue
12:00-20:00	Registration	Registration	—	Lakeview Hotel
18:00-20:00		Buffet	—	Solmer Western Restaurant 1F



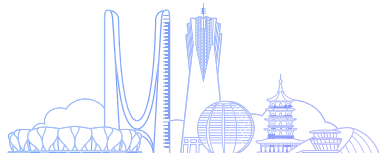
25th October 2025, Saturday, Day 1

Time	Event	Details	Chair	Venue
08:00-08:30	Registration			Lakeview Hotel
08:30-09:00	Opening Ceremony			HongBin Hall 1F
09:00-09:50	Plenary Lecture 1	Prof. Huiling Duan (Peking University, China) “Interfacial Flow Over Slip Boundary with Hierarchical Surface Structures”	Prof. Marian Wiercigroch	
09:50-10:40	Plenary Lecture 2	Prof. Tomasz Kapitaniak (Lodz University of Technology, Poland) “Synchronous and Desynchronous States of Coupled Oscillators”		
10:40-11:10	Tea/Coffee Break			Atrium 1F
11:10-11:40	Keynote Lecture 1	Prof. Tong-Earn Tay (National University of Singapore, Singapore) "Modeling Damage in Composite Structures"	Prof. Kwong Ming Tse Dr. Shanqing Xu	HongBin Hall 1F
11:40-12:10	Keynote Lecture 2	Prof. Hejun Du (Nanyang Technological University, Singapore) "Investigation of the Process-structure-properties of Polyamide 12 Additively Manufactured by Multi Jet Fusion Process"		
12:10-12:40	Keynote Lecture 3	Prof. Guoliang Huang (Peking University, China) "Non-Hermitian Elastic Metabeams with Nonlinear and Nonlocal Coupling"		
12:40-13:50	Lunch			Solmer Western Restaurant 1F
14:00-16:00	Parallel Sessions	Parallel Session 1A I (MS10)	Prof. Guangnan Zhu	HongBin Hall A 1F
		Parallel Session 1B I (MS13)	Prof. Ye Yuan	HongBin Hall B 1F
		Parallel Session 1C I (MS6)	Prof. Dan Wang	JinXiu Hall 1F
		Parallel Session 1D I (MS8)	Prof. Yang Li	LanBao Hall 2F
16:00-16:30	Tea/Coffee Break			Atrium
16:30-18:00	Parallel Sessions	In Honour of Prof. J. N. Reddy's 80th Birthday	Prof. Guannan Wang	HongBin Hall A 1F
		Parallel Session 1B II (MS13)	Prof. Jianjun Zhang	HongBin Hall B 1F
		Parallel Session 1C II (MS11)	Prof. Jianguo Cai	JinXiu Hall 1F
		Parallel Session 1D II (MS8)	Prof. Yang Li	LanBao Hall 2F
18:00-20:00	Dinner			Solmer Western Restaurant 1F



26th October 2025, Sunday, Day 2

Time	Event	Details	Chair	Venue
08:30-09:20	Plenary Lecture 3	Prof. Ke-Qing Xia (Southern University of Science and Technology, China) "Symmetry Breaking and Restoration in Turbulent Flows"	Prof. Guoxing Lu	HongBin Hall 1F
09:20-10:10	Plenary Lecture 4	Prof. Li Cheng (The Hong Kong Polytechnic University, China) "Vibration Energy Manipulation Through Acoustic Black Hole Effect Enhanced by Add-on Nonlinearities"		
10:10-10:40	Keynote Lecture 4	Prof. Xiaowei Chen (Beijing Institute of Technology, China) "New Progress in Hypervelocity Impact of Space Debris Cloud"	Prof. Chunli Zhang	
10:40-11:10	Tea/Coffee Break			Atrium 1F
11:10-11:40	Keynote Lecture 5	Prof. Fenghua Zhou (Ningbo University, China) "Propagations of Self-sustained Failure Front in Prince Rupert's Rods"	Prof. Yanqing Wang Prof. Jing Xie	HongBin Hall 1F
11:40-12:10	Keynote Lecture 6	Prof. Xuerui Mao (Beijing Institute of Technology, China) "Mode Decomposition of Non-stationary Flow"		
12:10-12:40	Keynote Lecture 7	Prof. Xubin Song (Zhejiang University of Science & Technology, China) "Taming Nonlinearity: From Theoretical Control to Industrial Innovation in Automotive Systems"	Dr. Xi Zhang	
12:40-13:50	Lunch			Solmer Western Restaurant 1F
14:00-16:00	Parallel Sessions	Parallel Session 2A I (MS3)	Prof. Yanqing Wang	HongBin Hall A 1F
		Parallel Session 2B I (MS9)	Prof. Chunli Zhang	HongBin Hall B 1F
		Parallel Session 2C I (MS2)	Prof. Zizhen Wang	JinXiu Hall 1F
		Parallel Session 2D I (MS5)	Prof. Weicheng Li	LanBao Hall 2F
16:00-16:30	Tea/Coffee Break			Atrium 1F
16:30-18:00	Parallel Sessions	Parallel Session 2A II (MS3)	Prof. Ronghua Huan	HongBin Hall A 1F
		Parallel Session 2B II (MS9)	Prof. Chunli Zhang	HongBin Hall B 1F
		Parallel Session 2C II (MS3)	Prof. Yanqing Wang	JinXiu Hall 1F
		Parallel Session 2D II (MS5)	Prof. Weicheng Li	LanBao Hall 2F
18:30-20:30	Banquet	Banquet (Prof. T. X. Yu's Lecture; The 65th Birthday of Prof. Marian Wiercigroch)	Prof. Ling Zhu Prof. Jian Yang	HongBin Hall 1F



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27th October 2025, Monday, Day 3

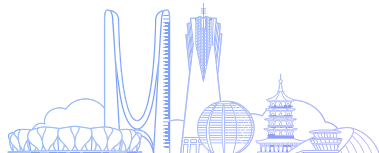
Time	Event	Details	Chair	Venue
08:30-09:20	Plenary Lecture 5	Prof. Dirk Mohr (Swiss Federal Institute of Technology Zurich, Switzerland) “Machine-learning based Constitutive Modeling in Combination with High-throughput Testing”	Prof. Ekaterina Pavlovskaia	HongBin Hall 1F
09:20-09:50	Keynote Lecture 8	Prof. Chaofeng Lv (Prof. Kecheng Li) (Ningbo University, China) "Supergravity-induced Instabilities in Soft Materials"	Prof. Yazhou Guo Prof. Ye Yuan	
09:50-10:20	Keynote Lecture 9	Prof. Chunan Tang (Dalian University of Technology, China) "The Breakup of Earth: from Rock Fracture Modeling to a New Hypothesis of Earth Evolution"		
10:20-10:50	Tea/Coffee Break			Atrium 1F
10:50-11:20	Keynote Lecture 10	Prof. Lihao Zhao (Tsinghua University, China) "Direct Numerical Simulations of Finite-size Particles Settling in a Quiescent Fluid"	Prof. Xin Li Dr. Jianjun Zhang	HongBin Hall 1F
11:20-11:50	Keynote Lecture 11	Prof. Jizhou Song (Zhejiang University, China) "Advanced Transfer Printing Techniques Based on Tunable Adhesives"		
12:10-13:10	Lunch			Solmer Western Restaurant 1F
13:30-15:30	Parallel Sessions	See programme for Parallel Session 3A (MS4)	Prof. Jian Yang Prof. Przemyslaw Perlikowski	HongBin Hall A 1F
		See programme for Parallel Session 3B (MS1+General)	Prof. Tao Huang	HongBin Hall B 1F
		See programme for Parallel Session 3C (MS7)	Prof. Rui Xiao	JinXiu Hall 1F
15:30-16:30	Tea/Coffee Break/Poster Presentations			Atrium 1F
16:30-17:00	Keynote Lecture 12	Prof. Biao Wang (Sun Yat-sen University, China) "The Origin of the Size Effect on Mechanical Behaviors of Conventional Materials"	Prof. Rui Xiao	HongBin Hall 1F
17:00-17:50	Plenary Lecture 6	Prof. Yonggang Huang (Northwestern University, USA) “Bioelastic State Recovery for Haptic Sensory Substitution”	Prof. Weiqiu Chen	
17:50-18:00	Conference Closure	Conference Closing Ceremony		
18:00-20:00	Dinner			Solmer Western Restaurant 1F



Detailed Program

Plenary Lectures

Date	Event	Time	Details	Chair	Venue
25 Oct Saturday Day 1	Plenary Lecture 1	09:00-09:50	Prof. Huiling Duan (Peking University, China) “Interfacial Flow Over Slip Boundary with Hierarchical Surface Structures”	Prof. Marian Wiercigroch	HongBin Hall 1F
	Plenary Lecture 2	09:50-10:40	Prof. Tomasz Kapitaniak (Lodz University of Technology, Poland) “Synchronous and desynchronous states of coupled oscillators”		
26 Oct Sunday Day 2	Plenary Lecture 3	08:30-09:20	Prof. Ke-Qing Xia (Southern University of Science and Technology, China) “Symmetry Breaking and Restoration in Turbulent Flows”	Prof. Guoxing Lu	HongBin Hall 1F
	Plenary Lecture 4	09:20-10:10	Prof. Li Cheng (The Hong Kong Polytechnic University, China) Vibration Energy Manipulation Through Acoustic Black Hole Effect Enhanced by Add-on Nonlinearities		
27 Oct Monday Day 3	Plenary Lecture 5	08:30-09:20	Prof. Dirk Mohr (Swiss Federal Institute of Technology Zurich, Switzerland) “Machine-learning based Constitutive Modeling in Combination with High-throughput Testing”	Prof. Ekaterina Pavlovskaja	HongBin Hall 1F
	Plenary Lecture 6	17:00-17:50	Prof. Yonggang Huang (Northwestern University, USA) “Bioelastic state recovery for haptic sensory substitution”	Prof. Weiqiu Chen	



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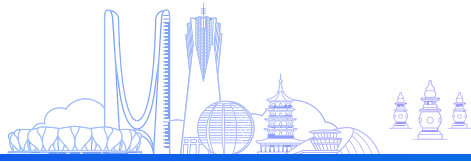


Keynote Lectures

Date	Event	Time	Details	Chair	Venue
25 Oct Saturday Day 1	Keynote Lecture 1	11:10-11:40	Prof. Tong-Earn Tay (National University of Singapore, Singapore) "Modeling Damage in Composite Structures"	Prof. Kwong Ming Tse Dr. Shanqing Xu	HongBin Hall 1F
	Keynote Lecture 2	11:40-12:10	Prof. Hejun Du (Nanyang Technological University, Singapore) "Investigation of the Process- Structure-Properties of Polyamide 12 Additively Manufactured by Multi Jet Fusion Process"		
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	Keynote Lecture 5	11:10-11:40	Prof. Fenghua Zhou (Ningbo University, China) "Propagations of Self-Sustained Failure Front in Prince Rupert's Rods"	Prof. Yanqing Wang Prof. Jing Xie	
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Date	Event	Time	Details	Chair	Venue
27 Oct Monday Day 3	Keynote Lecture 8	09:20-09:50	Prof. Chaofeng Lv (Prof. Kecheng Li) (Ningbo University, China) "Supergravity-Induced Instabilities in Soft Materials"	Prof. Yazhou Guo Prof. Ye Yuan	HongBin Hall 1F
	Keynote Lecture 9	09:50-10:20	Prof. Chunan Tang (Dalian University of Technology, China) "The Breakup of Earth from rock fracture modeling to a new hypothesis of Earth evolution"		
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	Keynote Lecture 11	11:20-11:50	Prof. Jizhou Song (Zhejiang University, China) "Advanced Transfer Printing Techniques Based on Tunable Adhesives"		
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Date: 25th October 2025, Saturday, Day 1

Time: 14:00-16:00

Venue: HongBin Hall A 1F

Parallel Sessions 1A

MS10: Theory and Application of SD Oscillator and Geometrically Nonlinear Dynamic System

Time	Presenter	Title
14:00-14:12	Qingjie Cao*	Theory and Applications of Geometry Nonlinear Dynamics: A Series of Smooth and Discontinuous (SD) Oscillators
14:12-14:24	Zhenyang Li	Applications of Geometric Nonlinear Dynamical Systems
14:24-14:36	Huilin Shang	Global Dynamics of a Geometrically Nonlinear Energy Harvester Across Multi-Stable Configurations
14:36-14:48	Yingxuan Cui	Bio-inspired Nonlinear Vibration Control and Energy Harvesting
14:48-15:00	Dan Wang	Energy Harvesting of The Rotating System Based on the Geometrical Nonlinear Design
15:00-15:12	Xinyi Huang	Degenerate Singular Closed Orbits and Chaotic Behaviour of a Double-winged Quasi-zero-stiffness System
15:12-15:24	Yuntian Zhang*	Isolation Performances and Optimization of Triple Quasi-zero Stiffness Isolators
16:00-16:10	Tea Break	



Date: 25th October 2025, Saturday, Day 1

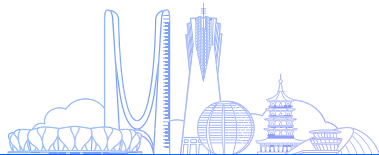
Time: 16:30-18:00

Venue: HongBin Hall A 1F

Parallel Sessions: In Honour of Prof. J. N. Reddy's 80th Birthday

MS12: J. N. Reddy's 80th Birthday

Time	Presenter	Title
16:10-16:22	Weiqiu Chen	Symplectic Contact Analysis of Finite-sized Functionally Graded Materials
16:22-16:34	Zhujiang Wang	Design and Optimization of Lattice Structures Under Complex Geometrical Constraints
16:34-16:46	Guannan Wang	Rotating Soft Macrogrooved Interfaces for Programmable Transport and Rebound-Driven Sorting
16:46-16:58	Jiaqing Jiang	Nonlinear Bending Deformation of Active Metabeam
16:58-17:10	Cheng Liu	Suppressing Grayscale for Multiphysics Topological Optimization of Multiphase Smart Materials and Structures via a dual projection
17:10-17:22	Zeyu Jiao	A Dual Mesh Control Domain Method for the Simulation of Viscous Incompressible Flows
17:22-17:34	Liang Wang	A Multi-Physic Phase-Field Framework for Chemical-Mechanical Failure Mechanisms in Fiber-Reinforced Composites
17:34-17:46	Xueyan Hu	Design Soft Pneumatic Actor via Explicit Topology Optimization
17:46-17:58	Weijian Zhou	Underwater Acoustic Absorption by Locally Resonant Anisotropic Plates



Date: 25th October 2025, Saturday, Day 1

Time: 14:00-18:00

Venue: HongBin Hall B 1F

Parallel Sessions 1B

MS13: Energy Absorption of Novel Materials and Structures

Time	Presenter	Title
14:00-14:12	Ye Yuan*	Dynamic Response of Functionally Graded Multi-Layered Plates to Localised Blasts
14:12-14:24	Xin Zhang*	Impact Properties of Shear Stiffening Gel and Its Reinforced Carbon Fiber Composite
14:24-14:36	Xiangyang Wu	The Effect of Excitation Frequency on Novel Three-Winding Magnetic Field-Assisted MIG Welding of 7075 Aluminum Alloy
14:36-14:48	Fan Yang	Achieving Multifunction Integration through Hypercube Lattice Metamaterials Inspired from Four-Dimensional Tesseract
14:48-15:00	Shanqing Xu*	Quasi-static and High-rate Flexural Response of Intralaminar-Hybridised Natural Fibre-Reinforced Polymer Composites
15:00-15:12	Chenying Liu	Finite Element Simulation of Head-Helmet Impacts with Nonlinear Foam Response and Coupled Neck Dynamics
15:12-15:24	Wei Qiang*	Tessellated Kresling Origami Structures with Rate-dependent Impact Resistance
15:24-15:36	Nie Yi	Modular Lattice Designs for Additive Manufactured Metamaterials with High Specific Strength and Energy Absorbing
15:36-15:48	Jianbang Shen	Friction-Enhanced Energy Absorption in Twist-Compression Metamaterials: Mechanisms and Performance
15:48-16:00	Yue Gao	Breaking Damping and Strength Trade-off in Titanium via Chemical Heterogeneity
16:00-16:30	Tea Break	



Date: 25th October 2025, Saturday, Day 1

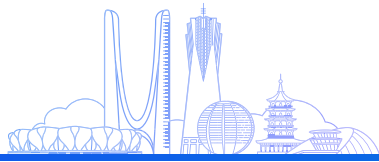
Time: 14:00-18:00

Venue: HongBin Hall B 1F

Parallel Sessions 1B

MS13: Energy Absorption of Novel Materials and Structures

Time	Presenter	Title
16:30-16:42	Haoru Xie	Dimensional Analysis of Impacted Rectangular Plates to Aspect Ratio Changes
16:42-16:54	Dongye Gao	Structural Modelling and Internal Pressure Performance Analysis of a Small-Scale Hydrogen Storage Tank
16:54-17:06	Yaning Cui	Large, Plastic Deformation Behavior of Lattice Structure in Compression
17:06-17:18	Xiufang Zhu	Research on Corrosion Resistance and Impact Performance of Graphene-modified Fibre Gradient Composites in Marine Environments
17:18-17:30	Zhejian Li*	Blast and Impact Mitigation Performance of Kirigami Corrugated Panels
17:30-17:42	Yinchuan He	Multidimensional Energy Absorption via Design of Hexagonal Honeycomb-Chiral Metamaterials
17:42-17:54	Jianpeng Ren	Design and Optimization Methodologies of Self-connected Star Honeycomb Structure



Date: 25th October 2025, Saturday, Day 1

Time: 14:00-18:00

Venue: JinXiu Hall 1F

Parallel Sessions 1C

MS6: Nonlinear and Complex Dynamics of Physical Systems

Time	Presenter	Title
14:00-14:12	Hanshu Chen	Adaptive Bifurcation and Global Dynamics Analyses Method of a Fractional Viscoelastic Nonlinear Airfoil Model under Complex Flight Conditions
14:12-14:24	Jinfeng Zhao	Elastic Spin in Metamaterials and Classical Structures
14:24-14:36	Zhenyang Chen	Fast-Slow Dynamics in a Pendulum with High-Low Frequency Excitations
14:36-14:48	Guangnan Zhu*	A Novel Design Method for Nonlinear Floating-Slab Track Vibration Isolator to Solve the Existed Paradox of Low-Frequency Vibration Isolation and Displacement Attenuation
14:48-15:00	Yanmei Kang	Efficiency Improvement of Stochastic Resonance in Tristable Energy Harvesting Systems and Its Uncertainty Quantification
15:00-15:12	Lianghui Qu*	Neurodynamic Studies Focusing on Autaptic and Electromagnetic Effects
15:12-15:24	Yajie Li	Response Control and Bifurcation Analysis of a Generalized and Fractional Rayleigh-Duffing Oscillator with Fractional Inertial Element under Recycling Noises
15:24-15:36	Xueqi Li	Higher-Order Interactions induce Stepwise Explosive Phase Transitions
15:36-15:48	Jagaran Chakma	Data-Driven Machine Learning Approach for Predicting Hydrodynamic Responses in Seismic Fluid-Structure Interaction of Small Modular Reactors
15:48-16:00	Dan Wang	Dynamic Responses Prediction on the Vortex-Induced Vibration of the Riser Excited by the Time-Varying Tension
16:00-16:12	Tianhu Yu*	Finite-Time Bipartite Synchronization Control of Coupled Inertial Neural Networks over Sign Graph
16:12-16:30	Tea Break	



Date: 25th October 2025, Saturday, Day 1

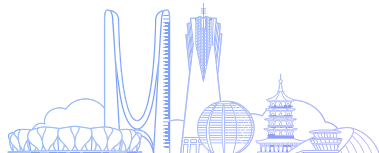
Time: 14:00-18:00

Venue: JinXiu Hall 1F

Parallel Sessions 1C

MS11: Nonlinear Mechanics of Origami and Deployable Structures

Time	Presenter	Title
16:30-16:42	Qian Zhang*	Cutting and Assembly Design of Origami Honeycomb
16:42-16:54	He Gao	Folding-Induced Transformations in Origami Lattices and Control of Mechanical Signal Propagation Properties
16:54-17:06	Kai Zhou	Design and Analysis of Origami-Enabled Tunable Membrane-Type Acoustic Metamaterials
17:06-17:18	Xuhong Shen	Experimental Study on Cluster Connection of Assembled Box Retaining Wall
17:18-17:30	Tianzhen Liu	Buckling and Rate-Dependent Behaviors of Viscoelastic and Shape-Memory Shells
17:30-17:42	Xianfeng Meng	Reliability Verification of Numerical Simulation Methodology for Aircraft Landing Impact Dynamics
17:42-17:54	Xi Zhang	Tunable and Programmable Perforated Miura-Ori Phononic Structures



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Date: 25th October 2025, Saturday, Day 1

Time: 14:00-18:00

Venue: LanBao Hall 2F

Parallel Sessions 1D

MS8: Multistable Morphing Structures: Mechanics, Design, Fabrication, and Applications

Time	Presenter	Title
14:00-14:12	Yangmian Wang	Topological Phase Transition and Boundary State of Mechanical Metamaterials
14:12-14:24	Pengyu Chen	Fluid-Structure Interaction of the Floating Dielectric Plate
14:24-14:36	Jihui Li	Kirigami-Inspired Rigid-Foldable Meta-Structure with a Bidirectional Self-Locking Property
14:36-14:48	Chaoyang Sun	Bimetallic Solid-State Bonding and Coordinated Deformation during Cross-Wedge Rolling Process
14:48-15:00	Hui Yang	Design and Dynamics of a Continuous Deployable Modular Manipulator with Controllable Bending inspired by Waterbomb
15:00-15:12	Dongtian Wu	Configuration Synthesis and Analysis of 1-Dof Inherently Balanced Deployable Mechanisms
15:12-15:24	Zhuhuan Wu	Analysis of Curved Beam Nonlinear Dynamics under Gravity Bias
15:24-15:36	Keyao Song*	Developable Tessellated Metamaterials Based on Flasher-like Curved-Crease Origami
15:36-15:48	Xiangyu Teng	Pseudo-Bistability of Curved Hard-Magnetic Soft Elastomer Beams Induced by Magneto-Viscoelastic Effects
15:48-16:00	Ke Huang	Torsional Quasi-Zero Stiffness Vibration Isolator for Flexible Cantilever Beams
16:00-16:30	Tea Break	
16:30-16:42	Yicheng Ruan	Dual-Mode Energy Absorbing Metamaterials Architected by Bistable Metal Shells
16:42-16:54	Weiwei Hu	Multi-Stable Mechanism for the Adaptive Grasping of an Origami-Inspired Gripper
16:54-17:06	Haiping Wu	Multi-Stable Origami-Based Multistable Metamaterials for Reusable Impact Cushioning
17:06-17:18	Xiao Hu	A Peculiar Multi-Stability Phenomenon Observed in Yoshimura-Origami Structure: Evolution and Regulation
17:18-17:30	Haitao Ye*	Electrothermally Controlled Origami Fabricated by 4D Printing of Continuous Fiber-Reinforced Composites
17:30-17:42	Yang Li*	Design and Applications of Multistable Morphing Structures



Date: 26th October 2025, Sunday, Day 2

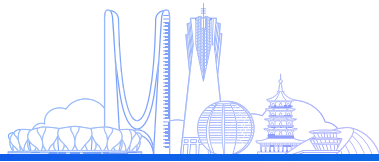
Time: 14:00-18:00

Venue: HongBin Hall A 1F

Parallel Sessions 2A

MS3: Dynamics, Vibration and Control

Time	Presenter	Title
14:00-14:12	Ekaterina Pavlovskaja*	Control of Co-Existing Attractors via Time-Delayed Feedback Methods
14:12-14:24	Lubing Wang	Exploring the Electrochemical and Mechanical Properties of Lithium-ion Batteries under Ocean Wave Impact Conditions
14:24-14:36	Xiao Yu	Nonlinear Kresling Origami Metamaterial with Coupled Local Resonators for Broadband Vibration Suppression
14:36-14:48	Jiawei Mao	Nonlinear Vibration Control of Discrete Dynamic Systems
14:48-15:00	Shi Zhan	Noise-Enhanced Stability in Synchronized Systems
15:00-15:12	Salamat Ullah	Analytical Insights and Physics-Guided Machine Learning in Structural Mechanics
15:12-15:24	Tianzhi Yang	Topological Quasiparticle Transitions in Twisted Moiré bilayers
15:24-15:36	Tianzhe Zheng	The Analysis of Vibrations of Axisymmetric Plates with an Initial Deformation
15:36-15:48	Changqi Cai	Semi-Active Quasi-Zero-Stiffness Metamaterial Beam for Tunable Low-Frequency Band Gap
15:48-16:00	Yangyang Zhang	Geometrically Nonlinear Thermo-Electro-Mechanical Analysis of Piezoelectric Beams Considering Material Nonlinearity
16:00-16:30	Tea Break	
16:30-16:42	Yat Sze Choy*	Flow through Meta-Liner with Acoustic Coupling
16:42-16:54	Francesco Pellicano*	Nonlinear Dynamics of Spiral Bevel Gears
16:54-17:06	Maohan Shen	Thermo-Structural Vibration Analysis of Pipelines by Means of Green's Function Method
17:06-17:18	Jinming Liu	A Virtual Shaker Voltage-Based Fixed Frequency Continuation Test Based On the Augmented Harmonic Balance Method
17:18-17:30	Cong Yunyue	Vortex-Induced Vibration of An Elastically Supported Cable in Uniform and Shear Flows: A Wake Oscillator-Based Numerical Study
17:30-17:42	Shushen Ye	Random Vibration Reduction and Isolation of Semi-Submersible Platforms



Date: 26th October 2025, Sunday, Day 2

Time: 14:00-18:00

Venue: HongBin Hall B 1F

Parallel Sessions 2B

MS9: Nonlinear Mechanics of Media with Multifield Couplings

Time	Presenter	Title
14:00-14:12	Yucheng Zhou*	Composition- and Random-Field-Dependent Phase-Field Modeling of Phase Transitions and Polarization Behavior in Lead-Free NBT-xST Relaxor Ferroelectrics
14:12-14:24	Hong-Bo Huang	Micromechanical Modeling of SFRC under Hydro-Thermal-Mechanical Loading
14:24-14:36	Bozheng Yang	Semi-analytical Modeling of Dislocation-inhomogeneity Interactions within a Nonsingular Dislocation Theory
14:36-14:48	Zinan Zhao	Nonlinear Current-frequency and Harmonic Generation in Film Bulk Acoustic Resonators
14:48-15:00	Zhizhen Jiang	The Explicit Elastic Field for Two Frictionlessly Joined Half-spaces with an Ellipsoidal Thermal Inclusion
15:00-15:12	Ruyuan Dai	Lamb Wave Propagation in Magneto-active Soft Plates Subjected to Magneto-mechanical Biasing Fields
15:12-15:24	Wei Jiang	Tunable Oblique SH Wave Propagation in Periodically Layered Magneto-active Elastomers
15:24-15:36	Kai Pan	The Electromechanical Coupling Effects in Functional Materials under SPM Probe
15:36-15:48	Jinlin Peng	Machine Learning Approach for Thermodynamic Potential Coefficients from P-E Loops
15:48-16:00	Kaifa Wang*	Elastic-Boundary-Controlled Bistable Curved Beam Metamaterials for Programmable Stability Switching and Energy Dissipation
16:00-16:30	Tea Break	
16:30-16:42	Shun-Qi Zhang*	Nonlinear Analysis of Magneto-electro-thermo-elastic Coupled Plates and Shells
16:42-16:54	Wenhua Zhang	Vibration Theory of Piezoelectric plate with Gradient Thickness to Frequency Programmable Design
16:54-17:06	Zhenhuan Zhou*	Stability Analysis of Multi-physical Fields Coupling Material Cylindrical Shell with Flexoelectric Effect
17:06-17:18	Dongliang Shan	Revealing the Mechanisms of Electrocaloric Effects by Simultaneously Direct Measuring Local Electrocaloric and Electrostrain
17:18-17:30	Yuyang Lu	Investigation of Mechano-electrochemical Coupling Failure Mechanisms in Lithium Ion Batteries



Date: 26th October 2025, Sunday, Day 2

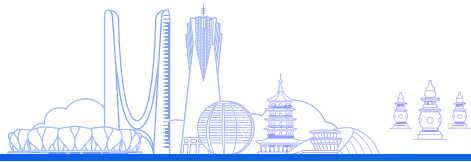
Time: 14:00-18:00

Venue: JinXiu Hall 1F

Parallel Sessions 2C

**MS2: Nonlinear Dynamics in Geo-energy Drilling & Production & MS3:
Dynamics, Vibration and Control**

Time	Presenter	Title
14:00-14:12	Zhiqiao Wang*	Penny-Shaped Hydraulic Fracture with Fluid Lag in Impermeable Elastic Medium
14:12-14:24	Xinyu Tang	Application of Component Mode Synthesis to the Analysis of Beams
14:24-14:36	Xinrong Li	Full-Wellbore Multibody Dynamics Analysis of Flexible Drill String Assemblies
14:36-14:48	Jingkai Chen	Drill String Vibration Analyses endowed with Mode Decomposition and Neural Network Prediction
14:48-15:00	Liangjie Mao*, Li He	Research on Stick-Slip Vibration Characteristics and Suppression Measures of Horizontal Well Drill-String
15:00-15:12	Weicheng Li	Dynamics and Energy Saving Control with Variable Frequency-voltage for Sucker-rod Pumping Systems
15:12-15:24	Wensheng Zhang	Numerical Investigation of the Mechanical Response and Energy Dissipation of Rock Specimens with Varying Pore Structures under Impact Loading
15:24-15:36	Haiquan Li	Dynamics Analysis of Drill-String Systems Based on the Absolute Nodal Coordinate Formulation Beam Elements
15:36-15:48	Yang Liu	Analysis of the Influencing Factors of Stick-slip Vibration and its Suppression
15:48-16:00	Shiyue Zou	Vibration-Induced Friction Reduction in Lunar Regolith Simulant: Mechanisms and Key Parameters
16:00-16:30	Tea Break	
16:30-16:42	Dou Xie	Experiments and Modelling of Drill-string Vibration with Axial-torsional Coupling
16:42-16:54	Xuecong Wang	Downhole Turbine Speed Control Design and Flow Dynamics
16:54-17:06	Yafeng Li	Impact of Vibration Patterns on Fatigue Life of Push-the-Bit Rotary Steerable Drilling Tools
17:06-17:18	Joseph Paez Chavez	Proportional-Derivative Control for Stick-Slip Reduction and Speed Adjustment in Drill-String Systems
17:18-17:30	Maolin Liao*	Dynamic Analysis and Experimental Verification of a Percussive Drilling System



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Date: 26th October 2025, Sunday, Day 2

Time: 14:00-18:00

Venue: JinXiu Hall 1F

Parallel Sessions 2C

MS3: Dynamics, Vibration and Control

Time	Presenter	Title
17:30-17:42	Yu Zhang	Stochastic Dynamic Analysis of Energy Harvesters under Random Excitation via DPIM
17:42-17:54	Mingjun Song	A Reconfigurable Mechanical Structure Inspired by the Mechanism of Rubik's Cube
17:54-18:06	Yifan Zhu	Vibrations of 3D Four-Directional Braided Composite Beams
18:06-18:18	Jie Xu*	Vectorized Modified Wavelet Method for Vibration Analysis of Complex Shell
18:18-18:30	Chencheng Lian	The Analysis of Free Nonlinear Vibrations with Fractional Damping



Date: 26th October 2025, Sunday, Day 2

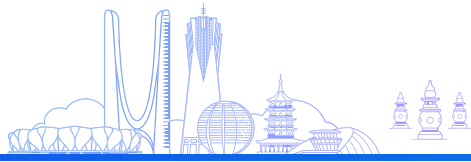
Time: 14:00-18:00

Venue: LanBao Hall 2F

Parallel Sessions 2D

MS5: Nonlinear Effects in Heavy Mechanical Machinery

Time	Presenter	Title
14:00-14:12	Zhifu Zhao	Natural Characteristics and Nonlinear Dynamic Behaviors of the 20-High Mill Under Heavy load
14:12-14:24	Zhiming Feng	Multiscale Slip-Line Field Modeling for Chamfered Tool Cutting Force Prediction
14:24-14:36	Jian Tang*	Modeling, Parametric Identification and Optimization of Nonlinear Vibrating Flip-flow Screen
14:36-14:48	Jie Liu*	Nonlinear Dynamics of a Novel DE-driven Soft Climbing Robot
14:48-15:00	Zitong Gao	Servo - controlled Air Valve Dynamic Response under Variable Loads
15:00-15:12	Yue Wang	Nonlinear Effects in Heavy Machinery Hydraulic Power Flow Control
15:12-15:24	Zhongrui Cui	Recognition and Motion-dynamic Control of Anthropomorphic Manipulators
15:24-15:36	Yigeng Li	Study on Vibration Characteristics of Vibration Dryers
15:36-15:48	Yingbing Sun	Magnetic Field Analysis of Electromagnetic Railgun Based on PINN
15:48-16:00	Jiajun Chen	Study on the Offset Load Mechanism of Herringbone Gears and Multi-objective Optimization of HSGT
16:00-16:30	Tea Break	
16:30-16:42	Ning Zhang	Model-data Hybrid Driven Approach for Remaining Useful Life Prediction of Cutting Tool Based on Improved Inverse Gaussian Process
16:42-16:54	Yujia Li*	Synchronization and Dynamic Optimization in Flexible Drive Vibrating Systems
16:54-17:06	Yanli Lin	Non-Associated Plasticity Model for AA6061 Tube Forming
17:06-17:18	Xuanhao Zhang	Creation Method of High-load Soft Gripper Based on Biomimetic Clustering
17:18-17:30	Deyuan Deng	Experimental and Numerical Investigation of Suspended-Dome Demolition



Date: 27th October 2025, Monday, Day 3

Time: 13:30-15:30

Venue: HongBin Hall A 1F

Parallel Sessions 3A

MS4: Dynamics of Systems with Friction and Impacts

Time	Presenter	Title
13:30-13:42	Przemyslaw Perlikowski*	A Yoke–bell–clapper System with Adjustable Geometry and Excitation
13:42-13:54	Bin Pei	Dynamic Analysis of the Rotor-Nacelle System Under Fractional Gaussian Noise Excitation
13:54-14:06	Zaida Gao	Hierarchical Friction Modeling of Multiscale Sliding Contact in Rough Surfaces
14:06-14:18	Jian Yang	Tailoring of Vibration Energy Transfer and Dissipation in Frictional Systems
14:18-14:30	Yixuan Zhou	Double-Joint Concentric Push-Pull Robots with Axial Frictional Contacts
14:30-14:42	Tengxiao Wang	Nonlinear Energy Transfer in Jointed Beams with Frictional Interfaces
14:42-14:54	Weiye Xu	Enhanced Nonlinear Vibration Isolation via Integrated Elastic Constraints and Linkage
14:54-15:06	Cui Chao	Performance of Inerter-based Isolator with Inherent Friction
15:06-15:18	Yuxi Li	Non-smooth Cantilever-type Piezoelectric Vibration Energy Harvester: Experimental Study and Global Dynamics
15:30-16:30	Tea Break / Poster Presentations	



Date: 27th October 2025, Monday, Day 3

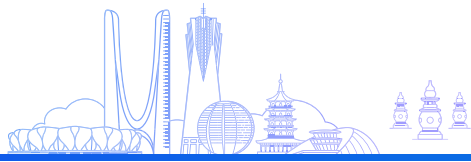
Time: 13:30-15:30

Venue: HongBin Hall B 1F

Parallel Sessions 3B

MS1: Dynamics of Advanced Machining & General Abstracts

Time	Presenter	Title
13:30-13:42	Dong Zhang	Prediction of Machined Surface Roughness Considering Transient Dynamics
13:42-13:54	Shanglei Jiang*	Multi-group Force Coefficients Based VPVHC Milling Stability Model with Runout
13:54-14:06	Guohui Yang	State Dependent Milling Dynamics with Nonlinear Effects of Vibration Displacement and Velocity
14:06-14:18	Senlin Ma	Nonlinear Dynamics Modeling and Analysis for Thin-Walled Structures Trimming
14:18-14:30	Yanru Jiang	Analysis of Process Damping and Stability in Milling Based on the Elastic-fully Plastic Contact Deformation
14:30-14:42	Tengyue Li	Analytical Evaluation of Nearly Singular Integrals in 2D General Anisotropic Elasticity Based on Dual Reciprocity Boundary Element Method
14:42-14:54	Yazhou Guo	A Hybrid Method Combining Strength Theory and Symbolic Regression for Developing a Fracture Model of Ductile Metals
14:54-15:06	Yu Du	Finite Integral Transform-based New Analytic Free Vibration Solutions of Functionally Graded Material Plates
15:06-15:18	Ju Wang	Dynamic Response Analysis of Low-grade Cement Concrete Pavement Under Impact Load
15:30-16:30	Tea Break	



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Date: 27th October 2025, Monday, Day 3

Time: 13:30-15:30

Venue: JinXiu Hall 1F

Parallel Sessions 3C

MS7: Soft Matter Modelling

Time	Presenter	Title
13:30-13:42	Rui Xiao	Damage of Tough Elastomers and Gels: Insights from Mechanochemistry
13:42-13:54	Ivan Breslavsky*	Modelling the Active Response of Human Aortic Tissue
13:54-14:06	Yangkun Du	Strain Train Stiffning and Electroactive Growth in Tissue Remodeling
14:06-14:18	Pingping Chai	Mullins Effect in Tensile Wrinkling of Hyperelastic Thin Films
14:18-14:30	Linghao Kong	Wrinkling Behavior in a Soft Magnetic Film Bonded to a Hyper-elastic Substrate
14:30-14:42	Shiyue Zou	Vibration-Induced Friction Reduction in Lunar Regolith Simulant: Mechanisms and Key Parameters
15:30-16:30	Tea Break	

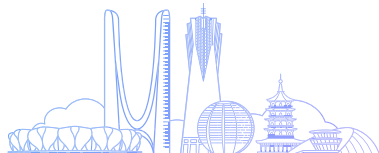


Poster Presentations

List of Posters

Presenting Time: 25th October 2025 - 27th October 2025

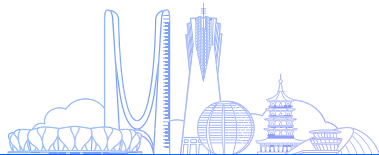
ID	Title	Presenter
16490	Study on the Deformation Mechanism of High-Capacity Silicon Anode Based on Chemo-mechanical Model	Yutao Shi
16306	Numerical Investigations on the Performance of the Kerosene-air Rotating Detonation Combustor with Different Combustion Chamber Configurations	Zhangkui Hu
16076	Nonlinear Dynamic Characteristics of Passive Heave Compensation for Deep-sea Mining Riser	Zhihao Xu
16074	Modulation Mechanism of Rotation Speed Fluctuation on Motor Noise	Zhibin Zheng
16051	Towards Efficient and High-Fidelity Stability Analysis for Quasi-Periodic Dynamics with Lyapunov Vectors	Limin Cao
15767	Hypervelocity Impact Resistance of Sandwich Panels with Al/PTFE Cores Subjected to Metal Jet Penetration	Wei Xiong
15743	Iterative Predictive Model for Quasistatic Deformation of Ball-End Cutter	Yuan Hao Fan
15737	Numerical Simulation of Pistol Bullet Penetrating Kevlar Vest Based on Ls-Dyna Secondary Development	Kun Liu
15726	A Novel Unified Solution Framework for Free Vibration of the Plate with a Rectangular Cutout	Jinghui Zhang
15719	Multi-Spacecraft Cooperative Observation Method Based on Distributed NMPC	Kaiqiang Chen
15626	A Generalized Framework for Multi-Branched Cracks with Arbitrarily Shaped Inhomogeneities	Bozheng Yang
15599	Bioinspired Kirigami Multi-stable Composite Structure	Jiayang Zhao
15595	Design and Performance Study of Mechanical Metamaterials with Neutral Equilibrium and Zero Force State	Yi Xia
15593	A Dynamic Control Method for Diamond Wire Sawing Processes	Zhiyuan Lai
15589	Boundary-Enhanced B-Spline Wavelets for Impact Oscillator Periodical Solution	Rui Yang
15577	Research on Cavitation Flow Field Reconstruction of Different Head-Shaped Vehicles During Water Exit Based on U-Net Neural Network	Qingkai Zhao



ID	Title	Presenter
15576	Assembly and Vibration Analysis for Multi-plate Array Space Structure	Tao Liu
15564	Dynamic Response and Sensitivity Analysis: Planetary Gear System with Stochastic Uncertainties	Yinghui Liu
15562	The Influence of Friction on the Performance of the Constant Quasi-Zero Stiffness Isolator	Feng Zhao
15557	Resonance Suppression in Nonlinear Systems via Piezoelectric Shunts Vibration Absorber	Weiting Chen
15556	Dynamic Modeling, Analysis, and Control of Flexible Origami Structures	Hesheng Han
15550	Novel Quasi-zero Stiffness Isolator Based on Slender Beam	Wen Shurui
15548	Global Dynamics of an SEIAR Model with Vaccination and the Age of Infection	Jiaoyan Wang
15544	Programming Mechanical Metamaterial Properties with Boundary Displacement Constraint	Weida Kang
15530	Dynamics Analysis of Extended Drill Pipe Strings	Fan Jinchao
15528	Multi-stable Origami and Reconfigurable Mechanisms Designed through Kinematic-Energy Coupling Effect	Jing Miao
15520	Modeling and Performance Investigation of Parallel Ultrasonic Vibration-Assisted Cutting	Wei Cai
15510	Material Removal Mechanism in Hybrid Fixed-Loose Abrasive Machining of SiC	Lei Guo
15490	The Design Of Programmable Bistable Structures For UAV Perching	Yongkang Jiang
15486	Dynamic Milling Force Modeling for Thin-Walled Components Considering Force–Displacement Coupling Effects	Teng Hu
15479	Drill String Dynamic Model for Directional Drilling Considering Nonlinear Bit–Rock Interaction	Jincheng Huang
15471	Nonlinear Behavior of 3D Printed Sandwich Lattice Structures	Xin Zhou
15454	Fragmentation of Dual-Phasic Staggered Materials under Impact Tension	Xun Xiong
15430	Comparative Performance of Voigt Type DVA with Inerter and Clutching Inerter	Tian Wu
15418	Dynamic Shear Failure Mechanism at the Interface of Carbon Nanotube Fiber Composites	Zhanjun Lan



ID	Title	Presenter
15417	Study on Dynamic Plastic Deformation Mechanisms of 301 Stainless Steel at Various Temperatures	Tingting Huang
15416	Backward Motion Suppression in Space-Constrained Piezoelectric Pipeline Robots	Jichun Xing
15397	Virtual Passive-Joint Space Based Dynamic Modeling for a 4-Dof Parallel Manipulator	Jie Zhao
15363	Study on Vibration Characteristics of Vibration Dryers	Weiwei Wang
15359	Mixed Robotic Machining System and Its Applications	Pengfei Su
15355	Nonlinear Vertical Vibration and Fault Identification of the Work Rolls	Jiaquan Xie
15328	Key Digital Twin Tech for Construction Machinery Lifecycle	Cunde Jia
15312	Multi-Field Coupling Dynamics of a New Type of Variable-Frequency Electric-Driven Fracturing Pump	Ge Zhu
15257	Dynamics of Helicopter Tail Drive Shaft System with Ballistic Impact	Chao Zhang
15067	Spectral and Spatiotemporal Dynamics in a Damped-Driven Nonlinear Wave Model	Praveen Kumar
15389	Investigation on Thermally Induced Response of 3D Space Thin-walled Structures Based on Carrera Unified Formulation	Xiaoliang Zhou
16539	Towards Efficient and High-Fidelity Stability Analysis for Quasi-Periodic Dynamics with Lyapunov Vectors	Limin Cao



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Plenary Speakers

Interfacial Flow over Slip Boundary with Hierarchical Surface Structures

Huiling Duan

College of Engineering, Peking University, People's Republic of China

E-mail: hlduan@pku.edu.cn

ABSTRACT: Interfacial flow is involved in varieties of natural phenomena and plays important roles in industrial applications. Boundary slippage, usually realized by underwater superhydrophobicity, provides a promising method to regulate interfacial flow and even complex bulk fluid transport by controlling the development of boundary layers and changing the near-wall flow structures. In this talk, a systematic study is presented on the stability and flow control of slip boundary with hierarchical surface structures. Basic physical laws underlying the dynamic evolution of the metastable states are revealed, enabling the prediction of plastron longevity and the realization of ultimate stable state both in closed and open systems. Upon the realization of slip boundary, in a confined microfluidics, three-dimensional backflow over liquid-gas interface is discovered, which is demonstrated to be caused by the interfacial tension gradient along the liquid-gas interface. In a turbulent boundary layer flow, slip boundary is implemented to substantially reduce drag. In a separation flow, hierarchical surface structures are demonstrated to be able to effectively control the flow separation. The current work paves the way for practical applications of Navier-slip boundary in flow control.



Biography: Prof. Huiling Duan is a Boya Chair Professor, founding director of faculty of Engineering, Dean of College of Engineering at Peking University. Her main research interests lie in interface mechanics and fluid-structure interaction mechanics., and published more than 240 peer-reviewed papers in Nature Commun., Science Advances, Proc. Natl. Acad. Sci., Phys. Rev. Lett., etc. She is a member of the Chinese Academy of Sciences, International Fellow of Canadian Academy of Engineering. Currently, she serves as Member of the International Union of Theoretical and Applied Mechanics (IUTAM) Symposia Panel for Solid Mechanics, Executive Member of Global Engineering Deans Council, Vice President of the Chinese Society of Theoretical and Applied Mechanics and Vice President of the China Women's Association for Science and Technology.



Synchronous and Desynchronous States of Coupled Oscillators

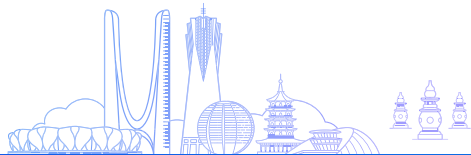
Tomasz Kapitaniak

Lodz University of Technology, Poland

E-mail: tomasz.kapitaniak@p.lodz.pl

ABSTRACT: Understanding the collective behavior of dynamical systems is essential for explaining various emergent phenomena in natural and engineered settings. A key step in this process is formulating an appropriate mathematical description of the individual systems and network of systems. In this context, a range of physical systems is considered here, including the classical pendula, superconducting Josephson junctions, power grids, and various others. Despite the diversity of the systems in terms of physical structure and their application domains, they exhibit strikingly similar dynamical features, namely, phase dynamics governed by inertia and damping and in their response to external forcing. This observation creates interest and motivates a search for a unified theoretical framework capable of capturing the fundamentals of their dynamical behaviors exhibited across the systems. This talk critically examines the up-to-date research activities on the dynamics of the second-order phase oscillator, henceforth claimed here as a universality class by its own merit as a simple nonlinear dynamical model representing a broad class of physical systems. It offers a common mathematical framework to develop a comprehensive understanding, from a general perspective, that bridges, the theoretical and experimental observations of pendulum motion, Josephson junctions, and power grids and their collective behaviors. While each of these systems has been discussed in disparate physical contexts, their underlying mathematical structures reveal strong commonalities. In particular, we highlight the importance of analyzing these systems through the lens of nonlinear phase dynamics to uncover their shared mechanisms and system-specific variety of behaviors as well. This survey mainly focuses on some specific interrelated themes: (i) collective phenomena and emergent synchronization; (ii) the role of heterogeneity in terms of system parameters and the effect of noise on the emergent dynamics; (iii) multi-stability and complex transient regimes; (iv) the integration of machine learning for model discovery, control, and prediction; and (v) the broader applicability of phase oscillator models across diverse domains beyond the canonical systems considered here. By systematically comparing the dynamical behaviors of the varied physical systems within a cohesive mathematical framework of second-order phase oscillators, this review seeks for the universal and distinctive features of nonlinear dynamics of the three systems, their collective behaviors such as emergent synchrony, partial synchrony, or chimera states, and specifically explains real-life phenomena, and crowd synchrony that may lead to a collapse of a footbridge and the failure of a power grid. Besides our main emphasis on these system, brief notes have been added on other systems where this second-order phase model explains their dynamical properties. A broad synthesis on the topic will not only deepen our theoretical understanding but also suggest any design and control of complex dynamical systems in both natural and engineered settings.

Keywords: Second-order phase dynamics, Pendulum, Josephson junction, Power grid



Biography: Professor Tomasz Kapitaniak educated in Poland, holds degrees in both mechanical engineering and applied mathematics. He is Head of the Division of Dynamics at the Lodz University of Technology and serves as Dean of Division IV (Technical Sciences) of the Polish Academy of Sciences, the highest scientific bodies in Poland. He is also a Member of the General Assembly of the International Union of Theoretical and Applied Mechanics (IUTAM), shaping the global research agenda in mechanics. An internationally recognised authority in theoretical and applied mechanics, nonlinear dynamics, network science, and complex systems theory, Professor Kapitaniak applies his work to engineering systems and critical infrastructure such as power grids. He has authored over 350 papers in leading journals. A member of numerous editorial boards, he is Associate Editor of CHAOS and EPL and has organised a dozen international conferences. His many distinctions include Honorary Professorships at Saratov State University and Yanshan University, Doctor Honoris Causa from Lublin University of Technology, election to the Polish Academy of Sciences (Corresponding Member in 2013, Full Member in 2019), and membership in Academia Europaea (2021). In 2025, he was named Fellow of the Asia-Pacific Artificial Intelligence Association.



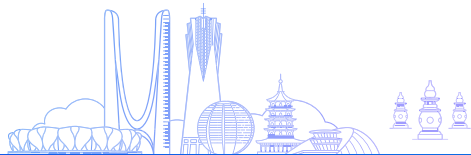
Symmetry Breaking and Restoration in Turbulent Flows

Ke-Qing Xia

Southern University of Science and Technology, China

Email: xiaq@sustech.edu.cn

ABSTRACT: We present experimental and numerical studies of turbulent Rayleigh-Bénard convection. Firstly, we present an experiment in a cylindrical cell. With the addition of a tiny amount of long-chain polymers, we find, surprisingly, that the large-scale flow structure possesses axisymmetric topologies, rather than the well-known single-roll large-scale circulation (LSC), itself a result of spontaneous symmetry breaking (SSB). This symmetry restoration is found to be accompanied by anisotropic suppression of velocity fluctuations, i.e., horizontal rms velocity becomes much less than the vertical one, as compared to the nearly isotropic bulk turbulence in the Newtonian case. This mechanism of symmetry restoration resulting from reduced fluctuations contrasts sharply to known symmetry restorations occurring in nature that usually result from increased thermal fluctuations. We further find that the net energy transfer between mean flow and turbulent fluctuations vanishes for axisymmetric topologies, whereas there is a positive net energy transfer from mean flow to turbulence for the lower-symmetry LSC topology (with or without polymers). A comparison of measured heat transfer efficiency and the large-scale flow topology points to a possible explanation for the original spontaneous symmetry breaking, in that the lower-symmetry LSC provides a higher transport efficiency. The present study provides an example of manipulating large-scale flow structures and their symmetries through small-scale properties, leading ultimately to the manipulation of turbulent transport. To further probe the connection between anisotropic suppression and symmetry restoration, we perform two-dimensional simulations incorporating large-scale friction. Both isotropic and anisotropic frictions are examined—the latter acting only on the horizontal velocity component. Interestingly, anisotropic suppression emerges even under isotropic friction, and restoration of reflection symmetry can be observed. Under anisotropic friction, suppression becomes more pronounced, yet the reflection symmetry remains broken, implying that anisotropic suppression is a consequence rather than a cause of symmetry restoration. Examination of the dynamical energy balance further shows that, as the friction coefficient increases and symmetry is restored, the coupling between buoyancy and velocity transitions from an indirect to a direct mode, enhancing the buoyancy–velocity correlation. Such enhancement can also be observed in our polymer experiments. This study suggests another route to symmetry restoration in turbulent convections by enhancing the buoyancy–velocity correlation, either via large-scale (friction) or small-scale mechanisms (polymer).



Biography: Ke-Qing Xia received his B.S degree in Physics in 1981 from Lanzhou University, China and PhD in Physics in 1987 from University of Pittsburgh, USA. He then carried out postdoctoral research in the University of North Carolina and Cornell University prior to joining the Chinese University of Hong Kong in 1992, where he served as Lecturer, Associate Professor, Professor and Choh-Ming Li Professor of Physics over the years. In 2018, he joined the Southern University of Science and Technology as a Chair Professor.

Ke-Qing Xia's research is primarily in the experimental studies of fluid turbulence, in particular thermally driven turbulent flows and laboratory study of geophysical flows. These include enhancement of scalar transport in turbulent flows; oceanic mixing and internal waves; studies of coherent structures in turbulence from the point of view of dynamical systems and statistical mechanics.

Xia is a recipient of China State Natural Science Award (2nd Class), China Higher Education Science and Technology Award and the Croucher Senior Research Fellowship. He is an elected Fellow of the American Physical Society (2010) and an elected member of the Chinese Academy of Sciences (2021).



Vibration Energy Manipulation Through Acoustic Black Hole Effect Enhanced by Ddd-on Nonlinearities

Li Cheng

Department of Mechanical Engineering, The Hong Kong Polytechnic University

E-mail: li.cheng@polyu.edu.hk

ABSTRACT: Energy manipulation in vibrating structures is critical for numerous engineering applications such as vibration mitigation, structural sound control and energy harvesting. Wave retarding structures, exemplified by acoustic black hole (ABH) structures, offer a promising solution. ABH features the slow wave effect inside a structure with reducing thickness, which entails non-reflective wave propagation of flexural waves and energy trapping. These properties, however, are limited to the high frequency range above the so-called cut-on frequency. To address the this deficiency in linear system design, this talk discusses the option of introducing intentional electromechanical coupling into an ABH structure via surface-coated PZT patches with nonlinear electrical shunts or grounded cables. The target outcome is to produce effective electro-mechanical coupling and cross-frequency energy transfer, thus improving the low frequency benefits of the ABH. Numerical modelling, salient phenomena and the potential of the technique for vibration mitigation is discussed using beam examples.



Biography: Dr. Li Cheng is currently Chair Professor, Director of the Consortium for Sound and Vibration Research (CSVr) and Associate Dean (Research) of the Faculty of Engineering at the Hong Kong Polytechnic University. After obtaining his Ph.D. degree from the Institut National des Sciences Appliquées de Lyon (INSA-Lyon,France), he became a faculty member at Laval University (Canada) in 1992, rising up to the rank of Full Professor before joining Hong Kong PolyU in 2000. He was formerly the Head of the Department of Mechanical Engineering. He currently serves as

Deputy Editor-in-Chief of the *Journal of Sound and Vibration*, Associate Editor of the *Journal of the Acoustical Society of America*, Associate Editor of *Structural Health Monitoring: An International Journal* and Topical Associate Editor of *Nonlinear Dynamics*. Dr. Cheng is a Fellow of the Academy of Sciences of the Royal Society of Canada, a Fellow of the Canadian Academy of Engineering, a Distinguished Fellow of the International Institute of Acoustics and Vibration, and a Fellow of five other societies. He is a past President of the Hong Kong Society of Theoretical and Applied Mechanics. He is currently the President the International Institute of Noise Control Engineering (I-INCE).



浙江大学
ZHEJIANG UNIVERSITY



Machine-learning based Constitutive Modeling in Combination with High-throughput Testing

Dirk Mohr

ETH Zurich, Switzerland

Email: dmohr@ethz.ch

ABSTRACT: Machine learning offers a powerful framework for deriving constitutive models directly from experimental data. Within the broad family of deep learning methods, recurrent neural networks (RNNs) are particularly well-suited for plasticity modeling, as their internal state naturally encodes history variables. After highlighting the limitations of standard RNNs, we introduce a mechanics-informed RNN formulation and demonstrate its integration into explicit finite element software. The results show that mechanics-based RNNs can serve as universal material models. In particular, they provide accurate surrogate representations of crystal plasticity (CP). Compared to traditional CP-FFT simulations, CP-RNN models achieve remarkable computational speed-ups, opening the door to the practical use of crystal plasticity in industrial applications. Beyond neural network architecture development, this lecture also presents novel robot-assisted experimental approaches that generate large-scale datasets for the identification of machine-learning-based plasticity and failure models.



Biography: Professor Dirk Mohr currently holds the Chair of Artificial Intelligence in Mechanics and Manufacturing at ETH's Department of Mechanical and Process Engineering. He joined the faculty of ETH in 2015 after heading the Experimental Dynamics Group at the Solid Mechanics Laboratory at Ecole Polytechnique (France). He was educated in Structural and Computational Mechanics at the University of Karlsruhe (Germany), the Ecole Nationale des Ponts et Chaussées (France) and the Massachusetts Institute of Technology (USA) where he received his PhD in Applied Mechanics in 2003. He is Associate Editor of the International Journal of Solids and Structures (IJSS) and the International Journal of Impact Engineering (IJIE). He also serves on the editorial boards of the journals Strain, Journal of Manufacturing and Materials Processing and the International Journal of Plasticity



Bioelastic State Recovery for Haptic Sensory Substitution

Yonggang Huang

Northwestern University, America

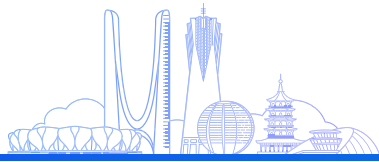
Email: y-huang@northwestern.edu

ABSTRACT: The rich set of mechanoreceptors found in human skin offers a versatile engineering interface for transmitting information and eliciting perceptions, potentially serving a broad range of applications in patient care and other important industries. Targeted multisensory engagement of these afferent units, however, faces persistent challenges, especially for wearable, programmable systems that need to operate adaptively across the body. Here we present a miniaturized electromechanical structure that, when combined with skin as an elastic, energy-storing element, supports bistable, self-sensing modes of deformation. Targeting specific classes of mechanoreceptors as the basis for distinct, programmed sensory responses, this haptic unit can deliver both dynamic and static stimuli, directed as either normal or shear forces. Systematic experimental and theoretical studies establish foundational principles and practical criteria for low-energy operation across natural anatomical variations in the mechanical properties of human skin. A wireless, skin-conformable haptic interface, integrating an array of these bistable transducers, serves as a high-density channel capable of rendering input from smartphone-based 3D scanning and inertial sensors. Demonstrations of this system include sensory substitution designed to improve the quality of life for patients with visual and proprioceptive impairments.



Biography: Yonggang Huang is the Achenbach Professor of Engineering at Northwestern University. He is interested in mechanics of stretchable inorganic electronics and mechanics-guided deterministic 3D assembly, and has published >700 journal papers, including 16 in Science and 10 in Nature. He is a member of the US National Academy of Engineering, US National Academy of Sciences, American Academy of Arts and Sciences, and a foreign member of Royal Society (London), Royal Society of Canada, Chinese Academy of Sciences, and 4 other academies in Europe and

Canada. In 2024 Society of Engineering Science established the Yonggang Huang Engineering Science Medal. In 2025 the Hagler Institute for Advanced Study at Texas A&M University established the John Rogers – Yonggang Huang Medal for Research Collaboration. In the same year the International Conference of Computational & Experimental Engineering and Science established the John Rogers/Yonggang Huang Medal. He is the only tenured/tenure-track faculty member having received the Cole-Higgings Teaching Award twice in the award history at Northwestern University. He is also the only foreign member to serve the chair of election committee in the >360-year history of the Royal Society.



Keynote Speakers

Modeling Damage in Composite Structures

T.E. Tay

Department of Mechanical Engineering, National University of Singapore, Singapore

ABSTRACT: In this presentation, multi-fidelity modeling and prediction of progressive damage and failure of notched fiber-reinforced laminates will be discussed. At the sub-laminate continuum scale, the primary mechanisms of progressive damage are matrix and fiber-matrix micro-cracks, delamination and fiber breakage with strong inter-mechanistic interactions. Early developments focused on material stiffness degradation, later also known as smeared crack models, because they are intuitive and easy to implement. Unfortunately, when applied within the finite element framework, the results are found to be mesh dependent. Later developments of cohesive zone and discrete crack models enabled the integration of these damage mechanisms into high-fidelity models with minimal sacrifice to the physics of interactions, although they generally incur high computational costs. Recent adaptive combinations of high and lower fidelity methods are shown to improve efficiency. This presentation outlines key developments and examples in the author's work, from smeared crack modeling, discrete crack modeling, fracture and strength characterization, explicit versus implicit finite element implementations, adaptive multi-fidelity modeling, and the potential to separately model non-linear contributions due to the evolution of cracks, material plasticity and local fiber realignments in thermoplastic composites.



Biography: T.E. (Tong-Earn) Tay is Professor at the Department of Mechanical Engineering, National University of Singapore (NUS). His current research interests are in progressive damage, failure, fracture, delamination, impact, and adaptive multi-fidelity and multi-scale computational analysis of fiber-reinforced composite materials and structures. He was formerly Head of Department of Dept of Mechanical Engineering, NUS, from 2011 to 2015, and Vice-Dean for Research for Faculty of Engineering, NUS, from 2009 to 2011. He serves on several editorial boards of leading composites journals.

He obtained research funding from various agencies and industry, including Rolls-Royce, Airbus Germany, Haliburton Far East, Vestas, US Air Force Office of Scientific Research, A-Star Science & Engineering Research Council, Defence Science Organization, Marine Port Authority and Ministry of Education. He is a recipient of JEC Life Achievement Award, a registered Professional Engineer (PE), Chartered Engineer (CEng), Founding Fellow of the Singapore Academy of Engineering (FSAE) and Council Member of the Asian-Australasian Association for Composite Materials.

Investigation of the Process-Structure-Properties of Polyamide 12 Additively Manufactured by Multi Jet Fusion Process

Hejun Du

Kaijuan Chen¹, How Wei Benjamin Teo¹, Weidong Li¹, Kun Zhou^{1,2}, Jun Zeng^{1,3}, Hejun Du^{1,2*}
¹HP-NTU Digital Manufacturing Corporate Lab, Nanyang Technological University, 50 Nanyang
 Avenue, Singapore 639798, Singapore

²School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50
 Nanyang Avenue, Singapore 639798, Singapore

³3D Lab, HP Labs, HP Inc., Palo Alto, California 94304, USA

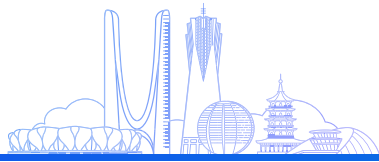
ABSTRACT: Multi Jet Fusion-printed polyamide 12 (MJF PA12) has been used for various engineering applications. In this research work, the effect of build position, build orientation, storage conditions, and storage period on the mechanical properties of MJF PA12 parts were investigated. Thermal history of MJF PA12 parts at different build positions was predicted and validated. Phase field model was utilized to study the crystallinity, and crystal phase of PA12 under different cooling rates. The relations among the cooling history, crystallinity, and mechanical properties of printed parts are investigated. Furthermore, to numerically model the deformation of MJF PA12, a finite-strain viscoelastic-viscoplastic constitutive model for the matrix of MJF PA12 was developed within the thermodynamic framework including the accumulated plastic deformation-induced damage into the proposed model. The model was able to predict reasonably well the deformation of PA12 as compared to the experiments, such as stress-strain and strain-time curves.

This work also presents a crystallinity prediction method based on machine learning for MJF-printed polyamide 12. In the model, the predicted thermal profiles and the experimental measurements of crystallinities were employed to train and optimize the machine learning regression model. The prediction results explain the formation of crystallinity is significantly affected by the duration of first cooling stage, temperature at the end of printing process, the duration of extremely low cooling rate, and the cooling condition of the second cooling stage. Additionally, an optimized Ridge regression model has been found to predict the crystallinity with good accuracy.



Biography: Hejun DU obtained both BEng and MEng from Nanjing University of Aeronautics and Astronautics, China in 1983 and 1986, respectively. Subsequently, he lectured there until he left for Imperial College of Science, Technology and Medicine, UK for his PhD study in 1988. He joined Nanyang Technological University, Singapore in 1991 after obtaining his PhD. He is currently an associate professor in the School of Mechanical and Aerospace Engineering, NTU. He served as the Head of Engineering Mechanics Division in the school from 2008 to 2011. He has led

as PI/Co-PI over 20 research grants from various research funding agencies, totaling more than S\$16 million. He has published over 260 international refereed journal papers. He and his group members were awarded a few patents, two of which were licensed by US company HP Inc. He has been on the Stanford University's list of the top 2% of the most cited scientists, since the first version from 2019.



Non-Hermitian Elastic Metabeams with Nonlinear and Nonlocal Coupling

Guoliang Huang

Department of Mechanics and Engineering Science, College of Engineering,
Peking University, Beijing 100871, China

ABSTRACT: Non-Hermitian elastic systems featured with active components exhibit rich topological wave phenomena, including non-reciprocal propagation, exceptional points, and non-Hermitian skin effect. Despite these advances, the roles of elastic nonlinear and non-reciprocal coupling on topological characteristics remains largely unexplored. In this work, we present the physical realization of a non-Hermitian elastic metabeam with both nonlinear and non-reciprocal coupling, realized by piezoelectric elements connected to programmable electronic circuits. An analytical framework is developed to describe amplitude-dependent wave dispersion and winding numbers. Our results show that Kerr nonlinearity enables tunable non-reciprocity, twisted winding topology, and multiple non-Hermitian topological phase transitions. Moreover, we demonstrate multi-loop twisted windings arising from nonlinear and high order nonlocal effects and validate non-Hermitian frequency conversion both numerically and experimentally. This study opens new avenues for dynamic control of wave, offering a foundation for next-generation elastic systems with amplitude-responsive functionalities.



Biography: Dr. Guoliang Huang is currently a Chair Professor of college of engineering at Peking University, and Changjiang Chair Professor at Peking University. 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 190 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.), with H-index of 69. 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 board in many other journals.



New Progress in Hypervelocity Impact of Space Debris Cloud

Xiaowei Chen (X.W. Chen)

Advanced Research Institute of Multidisciplinary Science, Beijing Institute of Technology, China
The State Key Lab of Explosion Science and Technology, Beijing Institute of Technology, China

ABSTRACT: The report presents the latest research progress of our research team in the field of hypervelocity impact, including models for wavefront geometric propagation related to space debris clouds, fragmentation mechanisms and distribution models of debris, structural characteristics of typical debris clouds, non-normal impact debris clouds, impacts on metal honeycombs/foams and woven composite materials, phase evolution of debris clouds, and simulations of dust plasma charging.

Biography:

Educations

PhD, School of Civil Engineering, Nanyang Technological University (NTU) Singapore, 2003
MPhil, Dept of Mechanical Engineering, Hong Kong University of Science and Technology (HKUST), 1999
BSc, Dept of Mechanics, Peking University, 1989

Awards

1. Owner of the National Outstanding Young Scientist Foundation of China (2012);
2. Award of Qiu Shi Outstanding Youth of China Association for Science and Technology (2012);
3. Owner of the National Plan for the Special Support for Top-notch Talents of China (2014).

Publications

More than 240 papers published in peer-review journals.

More than 100 invited and keynote presentations/lectures in conferences and universities.

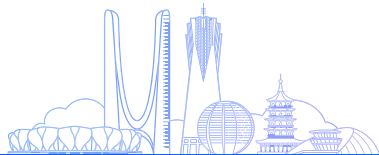
Three monographs of “Modelling on the penetration/Perforation (I,II)” (Sole author), and “Long-rod high-speed and hypervelocity penetrations”(First author), which written in Chinese and published by China Science Publishing & Media Ltd in 2019 and 2025, respectively.

Other Academic Jobs

Associate Editors of Defence Technology and Chinese Journal of Energetic Materials. Editorial Board Member of a few Journals, e.g., International Journal of Impact Engineering, International Journal of Protective Structures, Energetic Materials Frontiers, etc.

Research Interests

Hypervelocity impact, Penetration and perforation, Impact dynamics, Material dynamic behavior, Warhead design, Damage assessment, etc.



Propagations of Self-Sustained Failure Front in Prince Rupert's Rods

Jia Zhang, Yuxuan Zheng, Fenghua Zhou

MOE Key Laboratory of Impact and Safety Engineering, Ningbo University, China

ABSTRACT: "Prince Rupert's Drops" (PRD) are unique thermal-strengthened glass beads with a distinctive tadpole shape, created by rapidly cooling molten glass chunks in a water bath. The surface of the PRD exhibits remarkably high compressive failure strength at the head due to the presence of intense residual stresses. However, PRD is fragile at the tail, once the tail is broken by bending, a self-sustaining failure front propagates rapidly inside the specimen toward the head, causing the PRD to "explode" into small pieces.

This paper focuses on investigating the propagation characteristics of the failure front within PRDs. To eliminate any uncertainties arising from varying geometries, we employed long and slender glass rods as specimens, inducing high-level thermal residual stresses through quenching. These specially prepared specimens, referred to as "Prince Rupert's Rods" (PRRs), are shown in Figure 1. The magnitude and distributions of residual stresses are quantitatively evaluated using the Integrated Photoelasticity Technique. Failure front propagations in PRR specimens were experimentally investigated, as Figure 2 illustrates. Typically, the speed of the failure front remains constant within a sample and is influenced by the magnitude of internal residual stresses. A unique relationship between failure front velocity and the residual stress level exists, as Figure 3 shows. When the axial residual stress decreased from 220 MPa to 140 MPa, the failure front speed decreased from 1935 m/s to 1865 m/s. A lower limit of residual stress must be surpassed for the failure front to propagate self-sustainably. In our current experiments, if the axial residual stress fell below 130 MPa, a failure front could not develop. Cross-section size appears to have little effect on the failure front propagation process.



Figure 1 Specimen of Prince Rupert's Rods (PRRs)

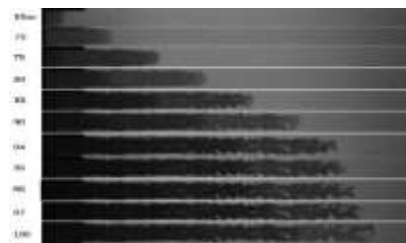


Figure 2 Failure front propagation process in a PRR

Keywords: Prince Rupert's drop; Tempered glass rods; Thermal residual stress; Self-sustained fragmentation; Failure front propagation

Biography: Zhou Fenghua, born in 1964, graduated from the Department of Modern Mechanics at the University of Science and Technology of China, earning a Bachelor of Science in Explosion Mechanics and a Master of Engineering in Solid Mechanics. He received his Doctor of Engineering in Aerospace Engineering from the University of Tokyo, Japan in 1996. After graduation, he has worked for ten years at institutions including the University of Tokyo, the National Aerospace Laboratory of Japan, and Johns Hopkins University in the United States, engaging in research on aerospace propulsion, ultra-high-temperature materials, material and structural strength, as well as solid and computational mechanics. Since returning to China in 2006, he has been engaged in teaching and research at Ningbo University, where he serves as a Chair Professor of Zhejiang Province. His main research interests include explosion and impact dynamics, strength and fracture of structures and materials, safety and protection, and computational mechanics.



Mode Decomposition of Non-stationary Flow

Xuerui Mao

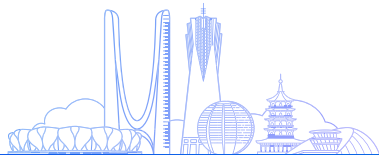
Beijing Institute of Technology, China

ABSTRACT: Non-stationary flow is ubiquitous in nature and engineering such as hurricanes, bypass transition from laminar to turbulence, the motion of sand dunes, etc, and is characterized by the convection, diffusion, merging, splitting of dominant features. Such characters bring challenge to classical modal analysis tools, e.g. POD and DMD. In this talk, new algorithms are developed dedicated to analyzing and decomposing non-stationary flows. In tests over co-rotating vortices, bypass transition, cylinder flows etc, it is demonstrated that these algorithms extract the key dynamics successfully and enable an efficient and effective construction of reduced order models of the complex dynamic system.



Sciences, etc.

Biography: Prof. Xuerui Mao received his Ph.D. from Imperial College London in 2010 and has been affiliated with the School of Interdisciplinary Science at Beijing Institute of Technology since 2021. His research focuses on dynamic data mining, turbulence and icing/anti-icing, and he has developed optimal boundary perturbation schemes, high-order multi-scale flow structure decomposition techniques, and data assimilation methods for datasets with various fidelities and completeness. His work has been published in Journal of Fluid Mechanics, Physical Review Letters, Advanced



Taming Nonlinearity: From Theoretical Control to Industrial Innovation in Automotive Systems

Xubin Song

Zhejiang University of Science and Technology, China

ABSTRACT: The pursuit of automotive excellence is fundamentally a dance with nonlinearity. From the smallest component to the integrated vehicle system, nonlinear dynamics are not merely a complication—they are the core physics that define performance boundaries. In an era of rapid transformation towards electrification and AI-driven informatics, the most significant competitive differentiators will still be forged by mastering these foundational physical laws. The true path to superior vehicle quality lies not in bypassing nonlinearity, but in harnessing it.

This keynote will chart the critical journey of nonlinear vibration controls from rigorous theory to successful industrialization. I will present two landmark cases that exemplify this transition. First, an intelligent control of magneto-rheological damper systems will be explored. While MR fluids offer millisecond response for unparalleled ride and handling, their inherent nonlinearities—magnetic saturation, viscoplastic behavior, and path-dependent hysteresis — pose a formidable control challenge. I will unveil a novel adaptive control framework that effectively conquers these hurdles, detailing its progression from theoretical model to validated industrial application. The second case shifts to the powertrain, where we leverage the nonlinear physics of a ceramic clutch to semi-actively dampen torsional vibrations across a wide frequency spectrum. This approach demonstrates how a deep understanding of frictional dynamics can solve complex NVH issues in modern drivetrains. Both cases underscore a critical paradigm: as NVH, refinement, and driving dynamics become the signature of quality, our industry must invest in deeper physical intelligence. The future belongs to those who can unlock the potential of nonlinearities, seamlessly uniting the sciences of dynamics and control to create the next generation of exceptional automotive systems.



Biography: Dr. Xubin Song is a Professor (2023-) at Zhejiang University of Science and Technology, a China's State Specially-Recruited Expert, and an ASME Fellow. Dr. Song's academic foundation is as international as his career, holding a PhD (1999) from Virginia Tech and an MS (1996) from North Carolina A&T State University in the United States, complemented by earlier degrees from the China Academy of Launch-Vehicle Technology (& Harbin Institute of Technology) and Nanjing University of Aeronautics & Astronautics.

His industrial journey showcases a progression of leadership in critical areas: he began with semi-active suspension and traction control systems for passenger cars at Visteon, advanced to transmissions and hybrid powertrains for commercial vehicles as a Principal Engineer at Eaton Corporation, and as VP & CTO of Weichai New Energy Technology Company, he spearheaded vehicle and powertrain electrification for buses and trucks. He is the founding Editor-in-Chief (2010-) of the International Journal of Powertrains. Author of more than 70 publications with one ASME Best Paper Award (2010), one co-authored English book "Advanced Powertrains for Commercial Vehicles", and multiple international patents, Dr. Song is a recognized authority on bringing nonlinear control theory to industrial applications in automotive systems.



Supergravity-Induced Instabilities in Soft Materials

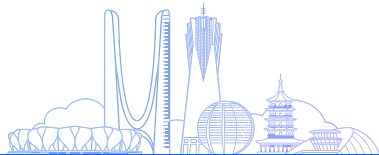
Lecturer: Kecheng LI, Associate Research Fellow; Chaofeng LÜ, Professor

Center for Mechanics Plus under Extreme Environment, Ningbo University, China

ABSTRACT: In this lecture, we demonstrate experimentally the phenomenon of hypergravitational Rayleigh–Taylor instability (HRTI) in solids by exploiting the centrifugal acceleration. It is observed that a hydrogel plate in a centrifuge undergoes a surface deformation with a patterned state as the centrifugal acceleration exceeds a certain threshold. The mechanism lies in that the hypergravity enhances the gravitational potential to overcome the elastic energy stored in the hydrogel plate. A finite deformation model is developed to predict the onset of HRTI and the post-buckling patterns, and it is revealed that a dimensionless critical hypergravity exists for a wider range of geometric size, mass density, elastic modulus and gravitational acceleration. We also observe that hydrogels with varying boundary constraints exhibit two types of instabilities under hypergravity: HRTI and Fringe instability, and we identify their competitive and transformative mechanisms. The findings indicate that hypergravity may provide a new way of tuning the Rayleigh-Taylor instability of solids from the aspect of gravitational potential. The results may offer references for interpreting natural instabilities associated with hypergravity, healthcare in hypergravity environments, and industrial fabrication of (micro)patterning.



Biography: Chaofeng Lü is currently the Vice President and Pao Yue-Kong Distinguished Professor of Ningbo University, the Director of Center for Mechanics Plus under Extreme Environments. His research interests include mechanics of smart materials and structures, flexible and stretchable intelligent devices, self-assembly of materials, and mechanics of materials under hypergravity conditions. He has co-authored over 170 refereed international journal articles including Nature, Science, PNAS, JPMPS, AM, AFM et al., as well as 50 international conference papers. These publications have received more than 8000 self-excluded independent SCI citations with an H-index 40. His recent awards include the Elsevier Highly Cited Researchers (2020, 2021), NSFC Distinguished Young Scientist (2019), Changjiang Scholar Young Scientist (2017), National Natural Science Award (2015), NSFC Outstanding Young Scientist (2013), and MOE Natural Science Award (2012). He is serving as the Standing Council Member of CSTAM, the Editorial Board member of Mechanics of Advanced Materials and Structures, Forces in Mechanics, Sensors, and Materials.



The Breakup of Earth from rock fracture modeling to a new hypothesis of Earth evolution

C. A. Tang

Dalian University of Technology, China

ABSTRACT: The magma ocean that existed on the early Earth finally solidified to form a coherent lithosphere. This lithosphere insulated the underlying mantle leading to warming, thermal expansion, partial melting and a geoid bulge. This in turn may trigger breakup of the lithosphere and the onset of plate tectonics. As a consequence, heat balance is disturbed, which results in thermal fluctuation. On a global scale, a cycle of warming and cooling happened many times throughout

geological history. This in turn may induce geological events as a response to the thermal cycles. The speaker will present a simple model of Earth evolution as a thermal system, based on rock fracture modeling method, trying to answer many questions about Earth's history that are as yet unanswered.



Biography:

Dr. C.A. Tang, as a chair Professor (funded by Cheung Kong Scholar Programme from State Education Ministry), is the Director of the Center for Rock Instability and Seismicity Research (CRISR) of Dalian University of Technology, China, and the Chair Professor of Computational Geoscience Research Center, Chengdu University of Technology, China. He is also the Vice President of the Chinese Society of Rock Mechanics CSRM, and the China National Group Chairman of International Society of Rock Mechanics. He got his Ph.D in 1988, in Northeastern University,

Shenyang, China, and continued his post-doctoral work between 1991-1992, in Imperial College, London, UK. Then, as an academic visitor, he had lots of experience in Canada, Australia, Sweden, Singapore, Switzerland and Hong Kong. He leads several major research projects in rock mechanics, especially on rock failure process analysis and monitoring in civil engineering. So far, he has published more than 300 technical papers on rock failure mechanisms and civil engineering, and is the author of six books of rock mechanics and the principle author of "Rock Failure Mechanisms" published by CRC Press, Taylor & Francis Group. In recent years, he is keen on Earth science research and, based on mechanics thinking, he put forward a new theory of Earth Evolution.



Direct Numerical Simulations of Finite-size Particles Settling in a Quiescent Fluid

Lihao Zhao

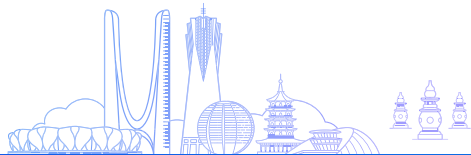
Tsinghua University, China

ABSTRACT: Understanding the dynamics of particles suspended in turbulent flows is a key in making advances in various engineering and environmental applications. We perform direct numerical simulation with a Eulerian-Lagrangian point-particle approach and fully resolved approach to study the dynamics of particles in different flow configurations. The present talk is on the recent findings of settling of finite-size non-spherical particle in a quiescent fluid. The results show a non-monotonic variation of the mean settling velocity as the volume fraction increases from dilute to dense suspensions. The preferential sampling of downward flows for clustered particles is ascribed to enhancing mean settling velocity in dilute cases. Meanwhile, the hindrance effect dominates and reduces the settling rate in high-volume fractions. In addition, we find the quiescent fluid becomes turbulent due to the presence of the particles.



Biography: Lihao Zhao is a Professor in fluid mechanics at Tsinghua University. His research interest is in the dynamics of turbulence and dispersed multiphase flow and the studies are mainly carried out by high-fidelity numerical simulations (DNS, LES). He has 90+ international journal publications, including Nature Sustain., PRL, Sci. Adv., JFM (25), and one of paper was featured in a “*Focus on Fluids*” article of Journal of Fluid Mechanics. He serves as an Editorial Advisory Board Member in *International Journal of Multiphase Flow*, *Acta Mechanica*, *Acta Mechanica Sinica* and so on.

Sinica and so on.



Advanced transfer printing techniques based on tunable adhesives

Jizhou Song

Department of Engineering Mechanics, Zhejiang University, China

ABSTRACT: Transfer printing is an emerging deterministic assembly technique, which enables the heterogeneous integration of classes of materials into desired functional layouts. It creates engineering opportunities in flexible and stretchable inorganic electronics and next generation Micro-LED display technology. The key for a successful transfer printing is the ability of adhesion switch from strong state for pick-up to weak state for printing. Here, we will present our recently developed advanced transfer printing techniques with massive and selective capabilities based on the design of tunable adhesives.



Biography: Jizhou Song is a QiuShi Distinguished Professor of Department of Engineering Mechanics at Zhejiang University. He is an ASME Fellow. His research interests include tunable adhesives for advanced transfer printing techniques and mechanics of flexible electronics. He served as an associate editor for Applied Mechanics Reviews and an editorial board member for various journals including npj Flexible Electronics, International Journal of Applied Mechanics, Acta Mechanica Solida Sinica, etc.



The Origin of the Size Effect on Mechanical Behaviors of Conventional Materials

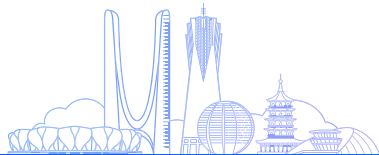
Biao Wang

Sino-French Institute of Nuclear Engineering and Technology, Sun Yat-sen University, China

ABSTRACT: The size effect—the significant variation of mechanical behaviors (such as strength and ductility) with specimen size—is a well-established phenomenon, especially in brittle materials. Based on the author's Thermodynamics Deformation and Strength theory, this study investigates the root cause of this effect in polycrystalline metals and composites. We propose that stochastic inhomogeneity of material properties is the highly probable mechanism driving the size dependence. Through various experiments on metallic wires and thin plates, we explored unexpected mechanical phenomena and, accordingly, developed and verified both theoretical and numerical models.



Biography: Prof. Biao Wang is a Cheung Kong chair professor of Sino-French Institute of Nuclear Engineering and Technology, Sun Yat-sen University, and also serve as the Dean of School of Material Science and Engineering, Dongguan University of Technology, China. As a principal investigator, he received dozens of domestic and international academic awards, such as the Citation Classic Award by ISI, etc. Additionally, his part-time Jobs in Academic organizations involves Chairperson of Guangdong Physics Society of China, and Standing Council Member of Chinese Society of Theoretical and Applied Mechanics. And he also serves in the editorial board of several international academic journals.



Transportation

A. Hangzhou East Railway Station → Hangzhou Lakeview Hotel:

a) By Taxi

Distance by Taxi : 8 km

Time by taxi: 22 minutes

b) By Public Transport

Route:

1) Take Metro Line 1 (Xianghu direction, take 5 stops) - Fengqi Road Station exit C4.

2) Walk 710 meters to Hangzhou Lakeview Hotel.

Time by metro: 27 minutes

B. Hangzhou Railway Station → Hangzhou Lakeview Hotel:

a) By Taxi

Distance by Taxi : 4 km

Time by taxi: 17 minutes

b) By Public Transport

Route:

1) Take Metro Line 1 (Xiaoshan International Airport direction, take 3 stops) - Fengqi Road Station exit C4.

2) Walk 710 meters to Hangzhou Lakeview Hotel.

Time by metro: 22 minutes

C. Hangzhou Xiaoshan International Airport → Hangzhou Lakeview Hotel:

a) By Taxi

Distance by Taxi : 30 km

Time by taxi: 55 minutes

b) By Public Transport

Route:

1) Take Metro Line 1 (Xianghu direction, take 22 stops) - Fengqi Road Station exit C4.

2) Walk 710 meters to Hangzhou Lakeview Hotel.

Time by metro: 1 hour 23 minutes

D. Hangzhou West Railway Station → Hangzhou Lakeview Hotel:

a) By Taxi

Distance by Taxi : 22 km

Time by taxi: 42 minutes

b) By Public Transport

Route:

1) Take Metro Line 19 (Yongsheng Road direction, take 7 stops) - West Lake Culture Square Station.

2) Transfer to Metro Line 1 (Xianghu direction, take 2 stops) - Fengqi Road Station exit C4.

3) Walk 710 meters to Hangzhou Lakeview Hotel.

Time by metro: 44 minutes



Local Tourist Information

Weather

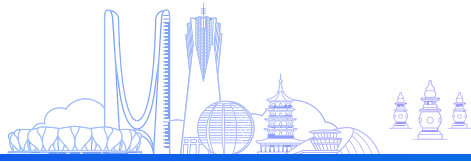


Scenic Spots

Hangzhou City Balcony

Hangzhou City Balcony is located in the Qianjiang new CBD. There is one major and two sub-balconies in total, and all are open and vibrant modern city parks that integrate relaxation and entertainment.





1. West Lake - the Legend of Hangzhou

West Lake is a symbol of Hangzhou. It is famous for its stunning scenery and various historical sites. It was selected as one of the "12 superb sunset spots around the world" by CNN.



2. The Grand Canal - World Heritage Site

The Grand Canal was dug out in 486 BC and has a history of more than 2,500 years. It runs from Beijing in the north to Hangzhou in the south, stretching for 1,747 Km.



3. Hangzhou Silk

Hangzhou is regarded as the cradle of the Chinese silk culture and production. With a history of over 2,500 years, Hangzhou Silk is renowned for its gentle texture, gorgeous colors, and wide varieties.





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