







The 4th

Hong Kong Wind Engineering Society Workshop

The Hong Kong University of Science and Technology Hong Kong SAR, China







Welcome Message

On behalf of the Organizing Committee and Professor Kenny Kwok, we warmly welcome all of you to participate in the 4th Hong Kong Wind Engineering Society Workshop. Together, we celebrate Professor Kwok's stupendous contributions in the bliss of his 70th birthday. His achievements and erudite are of beacon-bright to our field of Wind Engineering. Moreover, in this difficult time for Hong Kong, we would like to pass on a special thanks to you for your relentless support to our city and Wind Engineering Society. Your trust and encouragement are of prime character.

In the workshop, we have gladly received 34 presentations, including 4 Keynote Speeches and 2 Invited Speeches. We are also extremely honored to host more than 60 guests from Asia, Oceania, North America, and Europe. Our distinguished guests are from a range of disciplines, including universities, research institutes, corporate companies, professional consultancies, and government agencies. In HKWES 4, we will be discussing a number of key topics in Wind Engineering, including Bridge Engineering, Urban Wind Environment, Bluff-Body Aerodynamics, Macroscopic Winds, Wind Tunnel Techniques, and Wind Loadings, as well as some emerging topics like Dynamic Mode Decomposition and Machine Learning. Evidently, this workshop epitomizes the accumulated wisdom and innovative vision of our field, as they culminate into a symbiotic pursuit for greater knowledge.

The workshop is a collective effort of the organizing team and all our participants. We thank our outstanding organizers, Hong Kong University of Science and Technology, Hong Kong Polytechnic University, and Hong Kong Wind Engineering Society, who have provided us with tremendous platforms and resources. More importantly and with wholehearted gratitude, it is through the intellectual fruits of all our participants could this workshop be made possible. With that, we thank you again for your participation in HKWES 4. We hope you enjoy the exotic food, the stunning seaside view, the subliming research atmosphere, and two beautiful days in Hong Kong.

On behalf of the organizing team,



Conference Chair Tim K.T. Tse



Conference Co-Chair You-Lin Xu



Honorary Kenny Kwok

Organizers:

Hong Kong University of Science and Technology Hong Kong Polytechnic University Hong Kong Wind Engineering Society

Workshop Organizing Team

Conference Chair: Tim K.T. Tse (HKUST) Conference Co-Chair: You-Lin Xu (HK PolyU) Conference Secretaries: Xuelin Zhang, Gang Hu Organizing Committee: Asiri Weerasuriya, Cruz Y. Li, Jiayao Wang

Hong Kong Wind Engineering Society

President: Tim K.T. Tse

Members: Alex To, Neptune Yu, Johnny Yu, Xiaowei Deng
Brian Wong, Gang Hu, K.M. Lam









Conference Schedule

January 7, 2020

Time	Subject		Name	Topic		
09:00-09:15			Opening and Group Photo			
09:15-10:15	Keynote Speech 1 Chair: Yukio Tamura		Hui Li	Vortex dynamics and machine learning of wind effects of long-span bridges		
10:15-10:45			Coffee Break			
10:45-11:00	Session 1 CRF Project Chair: Xiaowei Deng	S1. P1	Chun-Ho Liu*,Zhi Ning, Tim K.T. Tse, Man Sing Wong	Next-generation air pollution physics and chemistry model for urban areas: an overview		
11:00-11:15		S1. P2	Haijing Pan*, Wenye Li, Chun-Ho Liu	LES study of plume dispersion over coastline		
11:15-11:30		S1. P3	Jingwei Xie*, Chun-Ho Liu, Yuhan Huang, Wai-Chuen Mok	Near-field vehicular plume mixing and roadside air quality		
11:30-11:45		S1. P4	Wenye Li*, Chun-Ho Liu	Large-eddy simulation of flows over discontinuous surfaces with roughness transition		
11:45-12:00		S1. P5	Sawaid Abbas*, Man Sing Wong	Assessment of vegetation damage by the super- typhoon Mangkhut in Hong Kong		
12:00-12:15		S1. P6	Xuelin Zhang*, Asiri Weerasuriya, Tim K.T. Tse	Application of particle image velocimetry (PIV) to investigate the flow field near lift-up buildings		
12:15-12:30		S1. P7	Asiri Weerasuriya*, Xuelin Zhang, Bun Lu, Tim K.T. Tse, Chun-Ho Liu	Pedestrian-level wind environment near a square-shaped super tall building with aerodynamic modifications in an urban area		
12:30-14:00	Lunch (Ground Floor China Garden Restaurant)					
14:00-15:00	Keynote Speech 2 Chair: Kenny Kwok		Nicholas Truong	The multi-sector method for directional dynamic responses and façade pressures: applications in typhoon, synoptic and mixed wind climates		
15:00-15:15	Special Session 1 Wind Tunnel Chair:	SS1. P1	Matt Glanville*, L.F. Gilet	Aerodynamic drag testing of cyclists incorporating a versatile wind tunnel testing platform		
15:15-15:30	Kenny Kwok	SS1. P2	Suresh Kumar*	The conundrum of internal pressure		
15:30-16:00	Coffee Break					
16:00-17:00	Invited Speech 1 Chair: Zengshun Chen		Neptune Yu	Glass damage study in Hong Kong during typhoon Mangkhut		
17:00-17:15	Special Session 2 Wind Loading Chair: Zengshun Chen	SS2. P1	John Holmes*	Generalized gust effect factors for wind loading codes and standard		
17:15-17:45		SS2. P2	John Holmes*, Seifu Bekele	The risk of extreme load effects allowing for directional variability		
17:45-18:00	Session 2 Bridge Engr. Chair: Sunwei Li	S2. P1	Bin Wang*	Vortex-induced vibration effects of bridge on running vehicle		
18:00-18:15		S2. P2	Helu Yu*, Bin Wang	Reliability evaluation of wind-induced driving safety on bridge		
18:15-18:30		S2. P3	Yan Li, Lei Yan*, Xuhui He, Mingjie Shi	Estimation of design wind speed of Tongzi River Suspension Bridge		
18:30-18:45		S2. P4	Lei Zhou*	Numerical simulations of aerodynamic characteristics of wind barriers on train-bridge system		
18:45	Shuttle Bus to Crowne Plaza					

January 8, 2020

Time	Subject		Name	Topic				
09:00-10:00	Keynote Speech 3 Chair: Qingshan Yang		Mingshui Li	Buffeting estimation of line-like structures: what aerodynamic admittance do we need?				
10:00-10:30	10:00-10:30 Coffee Break							
10:30-10:45	Session 3 Bluff Body Aerodynamics Chair: Kit Ming Lam	S3. P1	Qingshan Yang*, Tianhang Wang, Kenny Kwok, Yuji Tian	Dynamic interference mechanisms and flow characteristics of two identical square slender prisms				
10:45-11:00		S3. P2	Yukio Tamura*, Xiaoda Xu, Qingshan Yang	Characteristics of pedestrian-level winds around square buildings: effects of height and width				
11:00-11:15		S3. P3	Zengshun Chen*, Tim K.T. Tse, Cruz Y. Li, Kenny Kwok, Ahsan Kareem	A mathematical model for VIV-galloping force acting on slender prisms				
11:45-12:00		S3. P4	Fei Wang*, Kit Ming Lam	Large-eddy simulation and experimental investigation of wake flow around wall-mounted square cylinder				
11:15-11:30		S3. P5	Yixiang Wang*, Kit Ming Lam, Tim K.T. Tse	Direct numerical simulation for bidisperse inertial particles in turbulent channel flow				
11:30-11:45	Special Session 3 DMD and ML Chair: Kit Ming Lam	SS3. P1	Cruz Y.T. Li*, Tim K.T. Tse, Gang Hu	Reconstruction of flow field around a square prism using dynamic mode decomposition				
12:00-12:15		SS3. P2	Gang Hu*, K.C.S. Kwok, Tim K.T. Tse	Machine learning in wind engineering: case studies				
12:15-12:30		SS3. P3	Zilong Ti, Xiaowei Deng*, Hongxing Yang	Prediction of wake effect in wind farm using machine learning				
12:30-14:00	Lunch (Ground Floor China Garden Restaurant)							
14:00-15:00	Keynote Speech 4 Chair: Shuyang Cao		Ledong Zhu	Performance and aerodynamic control measures of wind-induced instability of long-span cable- stayed bridges with mainspans over 1000m				
15:00-16:00	Invited Speech 2 Chair: Gang Hu		Richard Flay	Natural hazards in New Zealand: the importance of wind research				
16:00-16:30								
16:30-16:45	Session 4 Macroscopic Winds Chair: Bin Wang	S4. P1	Shuyang Cao*	Physical and numerical modelling of tornado- like vortices				
16:45-17:00		S4. P2	Sunwei Li*, Zhengnan Pei	A new tropical cyclone boundary layer wind field model integrating models of vertical diffusivity and surface drag coefficients				
17:00-17:15		S4. P3	Jiayao Wang*, Tim K.T. Tse, Sunwei Li	A refined typhoon wind field model considering the effects of climate change				
17:15-17:30		S4. P4	Yunfei Fu*, Louis Benteux	Experimental and numerical investigation of the natural convective heat transfer in a Rayleigh-Benard system				
17:30-17:45		S4. P5	Jianping Sun*, Lieyang Wu, Yifan Wang, Mingfeng Huang	WRF-LES coupling simulation of typhoon Talim affecting Zhoushan Island				
17:45-18:00		S4. P6	Zifeng Huang, You-Lin Xu*, Sheng Zhan	S-transform-based method and its application in the spectrum estimation of stationary and non-stationary typhoon winds				
18:00-18:15	Closing							
18:15-21:30	Banquet (Conference Lodge UniQue Restaurant)							
21:30	Shuttle Bus to Crowne Plaza							

 $_{\mathrm{Page}}$ 03





Biography

Prof. Hui Li, Cheung Kong Scholarship Professor at Harbin Institute of Technology, China. Her broad research interests include artificial intelligence, data science and technology, structural health monitoring, fluid dynamics and wind engineering, structural vibration control and flow control, nanomaterials.

She is the authors and co-authors of more than 300 papers and keynote lectures, including one paper published in Science in 2019. She is the PI of more than 10 key projects supported by Natural Science Foundation of China (NSFC) and Ministry of Science and Technology of China (MOST). She is the leader of innovation teams of NSFC, MOST, the Ministry of Education of China, and the Heilongjiang Province. She was awarded by the Personnel Year of Structural Health Monitoring (2015), 4 National Prizes of Science and Technology of China and Outstanding Young Women Scientist of China.

She has served as the chairman of Committee of Scientific and Technology for Transportation of MOST, China. She is the current president of International Association for Structural Control and Monitoring, and current president of Asia-Pacific Network Center for Smart Materials and Structures. She also serves as consultant for structural health monitoring for long-span bridges (e.g. Hong-kong-Zhuhai-Macau Transportation links, Xihoumen Bridges, etc).

Keynote Title: Vortex dynamics and machine learning of wind effects of long-span bridges



Prof. Hui Li Keynote Speaker

Cheung Kong Scholarship Professor in Civil Engineering and Mechanics School of Civil Engineering, Harbin Institute of Technology

Biography

Prof. Ledong Zhu got his bachelor degree in engineering in 1986 and his master degree in engineering in 1989 at Tongji University, and his PhD degree in 2002 at the Hong Kong Polytechnic University.

He has worked for Tongji University since 1989, and is now the director of Research Division for Wind-resistance of Bridges and Structures of Department of Bridge Engineering of Tongji University, the deputy director of Key Laboratory of Transport Industry of Bridge Wind Resistance Technology (Shanghai) of China. Currently, he acts as the chairman of Wind Engineering Group of China Civil Engineering Society.

Prof. Zhu has engaged in the wind engineering research for over thirty years, and has published more than 140 journal papers. As the project leader, he has finished a large amount of wind engineering research and consulting projects related to long-span bridges, high-rise and super high-rise buildings and structures, large span structures. In recent years, his research has mainly focused on the theories and wind tunnel test technologies related to the nonlinear unsteady self-excited vibration of long and super-long span bridges and other bluff bodies, such as flutter, galloping, vortex-induced vibration.

Keynote Title: Performance and aerodynamic control measures of wind-induced instability of long-span cable-stayed bridges with mainspans over 1000m



Prof. Ledong Zhu
Keynote Speaker

Professor, Tongji University

Director, Research Division for Wind Resistance of Bridges and Structures, Dept. of Bridge Engineering, College of Civil Engineering, Tongji University

Deputy Director, Key Laboratory of Transport Industry of Bridge Wind Resistance Technology (Shanghai), Tongji University

Chairman, Wind Engineering Group, China Civil Engineering Society

Page 05





Biography

Prof. Mingshui Li is a professor in School of Civil Engineering at Southwest Jiaotong University (SWJTU) who specializes in long-span bridge aerodynamics and fluid mechanics since 2007. He had worked as a research engineer or consultant engineer at China Aerodynamics R&D Centre, COWI AS and Danish Maritime Institute.

He joined the SWJTU in December 2006 to engage in teaching and research work. Mainly engaged in wind resistance research of long-span bridges and high-rise buildings (structures), he has won first-class grants for outstanding scientific and technological talents in the army, and talented pacesetters of the General Equipment Department of the PLA.

He has served as a member of the Special Committee for Aerodynamics and Industrial Aerodynamics of the Aerodynamics Society (1999) and the Industrial Fluid Professional Group of the Fluid Specialty Committee of the Mechanics Society Member (1999), member of the Wind Engineering Special Committee of the Bridge and Structural Engineering Society (2001) / Vice-Chairman (2013), and editorial board member of Experimental Fluid Mechanics (2003). He is also responsible for and participated in more than 70 research projects including a Danish Science Foundation project, 7 National Natural Science Foundation projects, three National 863 projects, and wind resistance research on bridge buildings.

Keynote Title: Buffeting estimation of line-like structures: what aerodynamic admittance do we need?



Prof. Mingshui Li Keynote Speaker

Professor, Southwest Jiaotong University

Biography

Dr Nicholas Truong is a professional engineer with over 15 years of consulting, research and development experience in the field of fluid dynamics and wind engineering. Nicholas' particular interest and experience is in the use of wind tunnel testing and computational fluid dynamics to study and design the response of unusual structures under wind loading, as well as in the field of air and liquid fluid-structure interaction mechanics. He is also responsible for Windtech's ongoing innovation, research and development program to maintain Windtech's position as a global leader in the field of wind engineering.

Wind climate analysis is a critical aspect in the accurate analysis of wind loading on any structure. Nicholas also leads the climate analysis group at Windtech, who provide detailed analyses of wind speed and directional probabilities as well as seasonal variations in the case of thermal comfort studies. His analysis includes both micro and macro climate analysis.

Nicholas has undertaken and supervised wind engineering studies for numerous landmark developments, including wind tunnel investigations for: various high-rise buildings, large-span roof structures, stadiums, airports, statues and masts around the world. He is also a leader in the testing and analysis of wind loading and aerodynamic stability of bridges, including the testing of static and aero-elastic bridge testing to determine the aerodynamic performance of the bridge.

Prior to joining Windtech, Dr Nicholas Truong was a research fellow and part-time lecturer at the University of New South Wales studying fluid-structure interactions and continues to supervise research students in the area of fluid mechanics. His research experience includes the experimental testing of gas and liquid flows, the design of experimental and testing equipment and the numerical analysis of large data sets.

Keynote Title: The multi-sector method for directional dynamic responses and facade pressures: applications in typhoon, synoptic and mixed wind climates



Dr Nicholas Truong
Keynote Speaker

Director, WindTech

Corporate Member, Engineers
Australia (MIEAust) Member,
Australasian Wind Engineering
Society (AWES)







Biography

Professor Flay joined the Mechanical Engineering Department in 1984 as a senior lecturer, and he has been professor of Mechanical Engineering since 2000. His research interests are focused on the wind, and he has consulted and researched in the areas of wind engineering, wind energy, wind tunnel design, wind tunnel testing. A highlight was his design of the world's first wind tunnel capable of producing twisted flow for testing yacht sails. This wind tunnel was used by Team New Zealand, and helped them win the America's Cup in 1995. More recently he has advised on the design of wind tunnels in Hong Kong, Australia, India and New Zealand.

Professor Flay is Director of the Yacht Research Unit, which has a superb international reputation, and has carried out a large proportion of the world's wind tunnel testing of yacht sails. In 2014 the Yacht Research Unit moved to the University's Newmarket Campus, where it is co-located with the Aerodynamics Laboratory in the Wind Tunnel Hall, Building 901, Level 5. A closed circuit wind tunnel suitable for a wide range of aerodynamic investigations, with a test section 3.6 m wide and 2.5 m high has been designed and built, and was completed in June 2015. It has expanded the capability of the Yacht Research Unit and the Wind Engineering Group, and Prof. Flay's research group is undertaking exciting research on wind excitation of buildings, roofs, and other structures and we have developed new instrumentation to measure the wind environment around buildings for human comfort information. A special sensitive balance in the new wind tunnel is available to measure the drag of cyclists and skiers with an accuracy of +/- 1 gram, and it was also used to carry out wind tunnel tests on the Cyclors on the Emirates Team New Zealand catamaran that won the America's Cup in 2017.

Invited Speech Title: Natural hazards in New Zealand: the importance of wind research



Prof. Richard Flay
Invited Speaker

Professor of Mechanical Engineering, University of Auckland

Guest Professor, Central South University, Changsha, China

Guest Professor Tokyo Polytechnic University, Tokyo, Japan

Chair, Asia-Pacific Conference on Wind Engineering, Auckland NZ,

Board Member, International Association for Wind Engineering, IAWE

NZ representative on "Regional Harmonization of Wind Loading and Wind Environmental Specifications in Asia- Pacific Economies (APEC-WW)", 21st Century COE Program and the Global COE Program, Japan

Biography

Dr Neptune Yu, an Associate of Arup, is Arup's Wind Skill Leader of the East Asia. He has been a wind expert of the company since 2010, after his PhD study in the University of Manchester, UK. Dr Yu has extensive wind related consultancy experiences covering a wide range of building spectrum; he led wind designs of more than five 400m + super tall buildings and several large roof projects with horizontal dimension exceeding 500m, and supported wind designs of more than 60 projects across the mainland, Hong Kong, Macau, Taiwan, Korea, Vietnam, Thailand, Malaysia and Philippine. Dr Yu actively contributes to wind related code drafting of the region; he is the main coordinator of Arup (leading consultant) on drafting the recently published new Hong Kong Wind Code; he is also a drafting staff of the Wind Loads on Roof Structures (an Industry Code by the Ministry of Housing and Urban-Rural Development of China) and the Test and Evaluation Standard for Building Wind Environment (a Province Standard of the Guangdong Province).



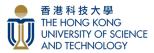
Dr Neptune Yu
Invited Speaker

Associate Leader, ARUP

Besides the role in Arup, Dr Yu is committee member of the Chinese Society for Wind Engineering and Industrial Aerodynamics and a guest lecture in PolyU of Hong Kong.

Invited Speech Title: Glass damage study in Hong Kong during typhoon Mangkhut

The Hong Kong University of Science and Technology







Guests of Honor



Prof. Kenny Kwok
University of Sydney



Prof. Yukio Tamura
Chongqing University



Dr John Holmes *JDH Consulting*



Prof. Qingshan Yang *Chongqing University*



Prof. Qiusheng LiCity University of Hong Kong



Prof. Shuyang Cao
Tongji University

Conference Venue

Mr and Mrs Lee Siu Lun Lecture Theater (LT-K)
The Hong Kong University of Science and Technology
Address: Clear Water Bay, Kowloon, Hong Kong, China

Official Language

The official language of the conference is English. In Hong Kong, most people speak Cantonese, but English and Mandarin are also popularly spoken and understood.

Recommended Accommodation

- Crowne Plaza Hong Kong Kowloon East
 Address: Tower 5, No. 3 Tong Tak Street, Tseung Kwan O, Hong Kong Tel: (+852) 39830388
- Holiday Inn Express Hong Kong Kowloon East
 Address: Tower 4, No. 3 Tong Tak Street, Tseung Kwan O, Hong Kong Tel: (+852) 31995588

Transportation

1.From Airport to HKUST

a.RED taxi from Arrival Hall, ~400 HKD

b.Bus A29 from Arrival Hall, alight at Nan Fung Plaza, transfer to Bus 11M or 91M to HKUST, ~50 HKD

2.From Airport to Crowne Plaza Kowloon East

a.RED taxi from Arrival Hall, ~330 HKD

b.Bus A29P from Arrival Hall, alight at Tong Ming Street, ~50 HKD

3. From Crowne Plaza Kowloon East to HKUST

a. A free shuttle bus is arranged and will depart Crowne Plaza every morning at 08:20 am. For return time, please refer to the conference schedule.

b. RED taxi, ~80 HKD c. Bus 11M from Hang Hau MTR Station, ~7 HKD

Banquet

We warmly invite you to attend the conference banquet, which will be held during 18:15-21:30 on January 8, 2020, at the UniQue Restaurant near the conference venue.

Wi-Fi

For Wi-Fi connection, please refer to the "ITSC eduroam Wi-Fi Service Configuration Guides" in the following link: http://itsc.ust.hk/services/general-it-services/wifi/wi-fi-services/configuration-eduroam/

Account name: ceguest
 Password: 2020hkweswii

Emergency Contact

Dr. Xuelin Zhang
 Tel: (+852) 94051178
 Email: xuelin.zhang@connect.ust.hk

• Mr. Cruz Y. Li Tel: (+852) 94056430 Email: yliht@connect.ust.hk





Dress Code

Conference: Smart Casual Banquet: Business Casual

Exchange Rate

As of Dec 9, 2019:

1 HKD = 0.90 RMB

1 HKD = 0.13 USD

1 HKD = 0.19 AUD

You may exchange your currency conveniently at the airport and local banks with a valid travel document.

Please note most merchants in Hong Kong will not accept 1000 HKD bill, but will accept smaller bills or credit card (Visa, Master, and Union Pay). Please also note only a very limited number merchants will accept Wechat/Alipay/Paypal/Apple Pay/Android Pay for payment.

Power Plug

Electricity supplied in Hong Kong is between 220-240 V at 50 Hz. Please note this voltage is twice of that in North America. The socket type is the British style, as shown on the right.



Weather

Temperature in Hong Kong in January is typically 15-20 degrees Celsius or 60-70 degrees Fahrenheit. We also do not expect too much precipitation. However, humidity in Hong Kong is typically high. We advise a check of the weather forecast prior to packing for the trip.

Tourist Information

Due to the special circumstance in Hong Kong, and to best ensure the safety of all participants, we advise against any tourist activities during the conference. However, a great selection of duty free merchants can be found in the airport prior to your departure.

Information for Presenters

- The screen ratio of keynote speech, invited speech, and all other sessions is 4:3.
- Copy your presentation file (either PowerPoint or PDF) of your oral presentations into your session computer before the beginning of your session.
- Each presentation is scheduled for 15 minutes (12 min. for presentation, 2 min. for questions and 1 min. for transition). Session chairs are kindly asked to strictly enforce the schedule.



Sponsors





Page 13

The Hong Kong University of Science and Technology

LOCATION MAP

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY



MTR Stations with bus or green minibus service to HKUST

提供往科大巴士或綠色專線小巴服務的港鐵車站

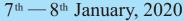


Transportation from airport to HKUST:

For passengers with bulky luggage, taking a taxi to HKUST direct is recommended. Those with simple luggage may take Airport Bus A22 to Lam Tin MTR station or A29 to Po Lam MTR station, and change for taxi to HKUST.

Departing from Po Lam (Public Transport Interchange) at midnight 12:00 to 05:00 to North Bus Station (HKUST) 午夜12:00至05:00由實林(公共交通交匯處)前往北門巴士站(香港科技大學)

Departing from Diamond Hill Station at 07:55 – 08:50 to North Bus Station (HKUST) Monday to Friday (except Public Holidays) 星期一至星期五(公眾假期除外),於07:55至08:50由鑽石山鐵路站前往北門巴士站(香港科技大學)



The Hong Kong University of Science and Technology



● 香港科技大學