THEMES OF THE WORKSHOP

This workshop is a platform for sharing information on the latest developments on structural dynamics and monitoring of structures under wind hazards and wind energy systems. Topics will include, but will not be limited to: structural dynamics, random vibrations, numerical methods, experimental methods (wind tunnel and full scale), monitoring and structural identification, aerodynamic and aeroelastic phenomena, and stochastic simulations. Applications include long-span bridges, buildings, cooling towers and wind turbines.

Invited speakers from Tongji University, P.R. China (TJU) and Northeastern University (NU) are kindly requested to prepare a 12-minute PPT presentation. Each presentation will be followed by a brief discussion (2 minutes). The objective of these presentations is to promote discussion among researchers and to identify common topics for future academic interaction between the two research groups.

Local organizers would like to take this opportunity to acknowledge the collaboration of Professors Shuyang Cao, Yaojun Ge, Lin Zhao and Ledong Zhu from the State Key Laboratory for Disaster Reduction in Civil Engineering, Tongji University, Shanghai, China. Special thanks also to Dr. Wei Cui, former PhD candidate at Northeastern University and currently Assistant Professor at TJU.

We would also like to recognize Ms. Martha Bogaty, logistics manager, from NU’s College of Engineering.

This workshop has been made possible through funding from the Graduate Dissertation Research Grant, provided by collaboration among NU’s Office of the Provost for Research and Graduate Education, the Graduate Student Government, and the College of Engineering. The Chinese delegation was supported by TJU Graduate College and the National Key Research and Development Program of China; these sponsors are gratefully acknowledged for supporting this workshop.

LIST OF PARTICIPANTS

From Tongji University, Shanghai, P.R. China
Faculty
- Professor Shuyang Cao, Full Professor
- Professor Lin Zhao, Full Professor, TJU Delegation Chairman
- Dr. Wei Cui, Assistant Professor
PhD Students
- Xiuyu Chen
- Wentian Chen
- Genshen Fang
- Shengyuan Liu
- Danyang Lu
- Saidong Ma
- Hao Sun
- Qiang Sun
- Mengen Wang
- Weituo Wang
- Qing Xia
- Xi Xie
- Yanyan Zhan

From Northeastern University, Boston, MA, USA
Faculty
- Professor Luca Caracoglia, Associate Professor and local organizer (in absentia)
- Professor Jerome F. Hajjar, CDM Full Professor and Department Chairman
- Professor Dionisio P. Bernal, Full Professor
- Professor Andrew T. Myers, Associate Professor
PhD Students
- Viet Le, workshop co-Chairman (Tel: +1.978.837.2726, le.vi@husky.neu.edu)
- Shaoning Li, workshop co-Chairman (Tel: +1.206.619.8733, li.shao@husky.neu.edu)
- Esmaeil Memerzadeh
AGENDA

Wednesday, May 22

3:00 pm Transfer Tongji University faculty and students from Logan International Airport to Lodging Accommodation (Northeastern University, East Village Housing, 291 St. Botolph Street, Boston MA 02115)

Thursday, May 23

Instructions and information for participants and presenters: workshop presentations will be held in Room 440, Egan Research Center of Northeastern University (120 Forsyth Street, Boston, MA 02115 – building #60 on the campus map). Every presentation is scheduled for 15 minutes (12 min. for presentation, 2 min. for questions and 1 min. for transition). A computer will be available in the meeting room for uploading the presentations; please upload your presentations during breaks before the beginning of each session. Breaks and Lunch will be served inside the meeting room in the Egan Research Center.

8:50am REGISTRATION (room 440, Egan Research Center, NU)

9:10am OPENING REMARKS
Viet Le, co-Chairman – NU-TJU WWE1, Northeastern University

Professor Jerome F. Hajjar, Chair, Dept. of Civil and Environmental Engineering, Northeastern University

Professor Lin Zhao, Full Professor of Civil Engineering, Tongji University

9:30am SESSION 1 (S1) Bridge Aerodynamics and Wind Energy (moderator: Professor L. Zhao, TJU)
S1-1 On the extrapolation of the distribution tail for dependent data (Special Presentation)
Andres Myers* (NU), Chi Qiao (NU)

S1-2 Aerodynamic forces of box sections under time-variant frequency vibrations in torsional DOF
Yanyan Zhan* (TJU), Lin Zhao (TJU), Yaojun Ge (TJU)

S1-3 Vortex-excited force nonlinearity evolution mechanism of a central-slotting box girder based on energy theory
Shengyuan Liu* (TJU), Lin Zhao (TJU), Yaojun Ge (TJU)

S1-4 Wind-induced buffeting response of long-span bridges based on typhoon wind characteristics
Xi Xie* (TJU), Wei Cui (TJU), Lin Zhao (TJU), Yaojun Ge (TJU)

S1-5 Study on the nonlinear aerodynamic forces under the steady-state motion of box girder section
Danyang Lu* (TJU), Lin Zhao (TJU), Yaojun Ge (TJU)
10:45am BREAK and NU-TJU WWE1 GROUP PICTURE

11:15am SESSION 2 (S2) Nonstationary Wind Phenomena, Fluid-Structure Interaction and Damage Detection (moderator: Dr. W. Cui, TJU)
S2-1 An exploration on the use of limit cycles in damage detection
Esmaeil Memerzadeh* (NU), Dionisio Bernal (NU)
S2-2 Tornado-induced internal pressures and roof forces on gabled-roofed low-rise buildings
Mengen Wang* (TJU), Shuyang Cao (TJU), Jinxin Cao (TJU)
S2-3 One-dimensional turbulence effect on aerodynamic admittance and buffeting force with multi-fan wind tunnel
Saidong Ma* (TJU), Zujun Zhao (SPTDHP), Jinxin Cao (TJU), Yaojun Ge (TJU)
S2-4 Performance-based design of vertical structures impacted by thunderstorm downburst and tornado wind loads by wavelet-Galerkin approach
Viet Le* (NU), Luca Caracoglia (NU)

12:15 pm LUNCH

1:15pm SESSION 3 (S3) Stochastic Methods, Uncertainty Quantification and Structural Optimization (moderator: Professor S. Cao, TJU)
S3-1 Statistical modeling of hurricane over North Atlantic Ocean simulation (Special Presentation)
Wei Cui* (TJU), Luca Caracoglia (NU)
S3-2 Copula function based statistical analysis of wind velocity and wave height joint probability distribution
Qing Xia* (TJU), Lin Zhao (TJU), Yaojun Ge (TJU)
S3-3 CFD-based flutter-oriented aerodynamic shape optimization of streamlined decks using surrogate models
Qiang Sun* (TJU), Chuanxin Hu (TJU), Peng Qin (TJU), Demu Huang (TJU), Zhiyong Zhou (TJU)
S3-4 Study on flutter performance of a super-long-span cable-stayed bridge under large attack angles via wind tunnel sectional model tests
Wentian Chen* (TJU), Ledong Zhu (TJU), Qing Zhu (TJU)
S3-5 Numerical and experimental studies on stochastic flutter of offshore wind turbine blades
Shaoning Li* (NU), Luca Caracoglia (NU)

2:30pm BREAK

2:45pm SESSION 4 (S4) Bluff Bodies: Fundamentals and Applications (moderator: V. Le, NU)
S4-1 Use of stochastic calculus for non-deterministic flutter analysis of wind turbine blades under random perturbations (Special Presentation)
Luca Caracoglia* (NU)
S4-2 Numerical simulation of flow around bluff body based on an immersed boundary method
Weituo Wang* (TJU), Shuyang Cao (TJU)

Xiuyu Chen* (TJU), Ledong Zhu (TJU)
S4-4 Simplified nonlinear models for vortex-induced forces and their parameters identification
Hao Sun* (TJU), Ledong Zhu (TJU), Qing Zhu (TJU), Linqing Du (TJU)

3:45pm SESSION 5 (S5) PANEL DISCUSSION: research differences between China and USA, student academic life in the two countries, opportunities for collaboration between the two groups

4:30pm CLOSING REMARKS
Shaoning Li, co-Chairman – NU-TJU WWE1, Northeastern University

4:50pm TOUR OF NORTHEASTERN UNIVERSITY’S WIND TUNNEL
057 Richards Hall

6:10pm MEET UP FOR DEPARTURE TO SOCIAL DINNER
1st floor / lobby area, East Village Housing, 291 St. Botolph St., Boston MA

6:30pm SOCIAL DINNER (for pre-registered participants only)
Legal Seafood, 100 Huntington Avenue, Copley Place, Boston, MA 02116

Friday, May 24

1:00pm FREEDOM TRAIL TOUR (for pre-registered participants only) - 1.5 hours
Meeting Point: Boston Common Visitor’s Center
139 Tremont Street, Boston, MA 02111

Saturday, May 25

Departure for Logan Airport
BOSTON ATTRACTIONS AND DINING

General Information
Boston, first incorporated as a town in 1630, and as a city in 1822, is one of America’s oldest cities. One of the best ways of navigating Boston’s historic sites is the Freedom Trail. The Trail takes the visitor to 16 historical sites in the course of two or three hours and covers two and a half centuries of America’s most significant past. A red brick or painted line connects the sites on the Trail and serves as a guide. Since the past and the present live alongside the Trail, its visitors have the opportunity to see the City as it truly is. Some of the historical sites included in the Freedom Trail are the Boston Common, State House, Park Street Church, Granary Burying Ground, Old South Meeting House, Old State House, Site of the Boston Massacre, Faneuil Hall, Paul Revere House, Old North Church, Copp’s Hill Burying Ground, USS Constitution, and the Bunker Hill Monument.

In addition to Northeastern University, Boston has many other colleges and universities that are available to visit, including scientific and engineering-focused schools such as Harvard University, Massachusetts Institute of Technology, Boston University, Tufts University, and Wentworth Institute of Technology. Other prominent institutions are Berklee College of Music, Massachusetts College of Art and Design, Emerson College, New England Conservatory, and many more. More than a quarter million students attend colleges and universities in Boston alone making Boston a very young, energetic, and inspiring city.

For more information about activities in and around Boston please contact the Greater Boston Convention and Visitors Bureau at (888) SEE-BOSTON (888-733-2678).

Getting Around Boston
Walking: Chances are you’ve heard Boston referred to as “the walking city.” The City of Boston works hard to live up to this title. Its Public Works and Transportation Departments are constantly marking crosswalks, performing regular maintenance of traffic signals and pedestrian pushbuttons, and using innovative pedestrian safety signs at busy locations in downtown Boston.

Driving: The City of Boston has partnered with local company Zipcar to promote car-sharing in an effort to reduce congestion and promote sustainable transportation alternatives.

Commuter Rail/Subway/Bus: Thousands of residents and visitors use the extensive MBTA system of subways, commuter trains, and buses to get in and around Boston. Visit www.mbta.com for information on schedules and fares and to access the trip planner tool.

Taxis: Boston’s taxis are regulated by the Boston Police Department’s Hackney Carriage Unit. The Department has been working to promote greener, fuel-efficient taxis through the Clean Air Cab program, providing online services to improve customer experience, and implementing the use of credit fare readers.

Shopping and Dining
In the Back Bay, visitors can walk the length of Newbury Street for some of Boston’s most chic, fashionable stores. Boylston Street (which runs parallel to Newbury Street) has a number of fine department stores. There are several shopping centers in the heart of the city; the Shops at the Prudential Center connects by walkway to Copley Place, an enclosed mall full of upscale stores and restaurants. Downtown Crossing has the full range of national department stores, boutiques and pushcarts, which offer both the familiarity of home and local Boston souvenirs. From comfort food to gourmet cuisine, there’s something in Massachusetts to satisfy everyone’s inner foodie. State specialties include fresh Atlantic seafood, authentic Italian in Boston’s North End, and farm-to-table freshness from our numerous farmers’ markets. Restaurant options are plentiful both on campus and within a half-mile radius of Northeastern.

On Campus
- Chicken Lou’s (lunch), across from law school on Forsyth Street.
- Churchill Hall Dining Room (serves breakfast and lunch; breakfast voucher not accepted)
- Faculty Center (serves lunch; it is recommended you call ahead at (617) 373-3535)
- Food Court at Curry Student Center (Starbucks, Sweet Tomato Pizza, U-Burger and more)
• **Marino Center** (Tatte Bakery & Café, BeGood, Qdoba, Wollaston’s Market)

**Off Campus**
• **Panera** (Lunch) Across from Uno’s and the YMCA
• **Cheesecake Factory** in the Prudential Center Mall (Lunch and Dinner)
• **Lucca** (Dinner, more upscale), on Huntington Avenue (across from Prudential Center Mall)

**Entertainment**

*Museums*: Boston has museums to suit almost every interest. The Museum of Fine Arts offers one of the largest art collections in the world. Also offering contemporary art is the Institute for Contemporary Art, newly-relocated to the Waterfront district. The Isabella Stewart Gardner Museum has a garden courtyard blooming with life in all seasons, surrounded by three floors of galleries. The Museum of Science offers hands-on exhibits, laser shows and IMAX films that are fun for all ages, while the newly-renovated Children’s Museum can entertain and educate children and their parents.

*Shows and Concerts*: Boston has a strong tradition of performing arts. In the theatre district, there are the Opera House, Colonial Theatre, Wilbur Theatre, Shubert Theatre and the Wang Center for the Performing Arts. The world-renowned Boston Symphony Orchestra and the Boston Pops perform at Symphony Hall.

*Parks*: Boston has multiple park systems within the city, including the Emerald Necklace, a 1,100-acre chain of nine parks, including the Public Garden and the Boston Common. In the summer, the Boston Common’s Frog Pond features a spray pool for children and the Swan Boats at the Public Garden. Just a short ferry ride from the city, you can visit the Boston Harbor Islands, the country’s newest National Park.

*Sports*: Boston is home to several well-known franchises, most especially the Boston Red Sox, who won the 2004, 2007 and 2018 World Series Championships.

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**CAMPUS MAP**

- #60 Egan Engineering/Science Research Center (Workshop Location)
- #42 Richards Hall (Wind Tunnel Location)
- #58 Snell Engineering Center (Civil and Environmental Engineering Department)
- #82 East Village (Dormitory)