

Delong Zuo

Associate Professor
Department of Civil and Environmental Engineering
Texas Tech University

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GENERAL INFORMATION

Education

Ph.D. in Civil Engineering May 2005
The Johns Hopkins University
Dissertation: "Understanding Wind- and Rain-Wind-Induced Stay Cable Vibrations"
Advisor: Professor Nicholas P. Jones

Master of Science in Civil Engineering May 2003
The Johns Hopkins University

Master of Science in Structural Engineering April 1999
Chongqing Jiaotong University, Chongqing, China

Bachelor of Engineering in Civil Engineering (with highest honor) July 1996
Chongqing Jiaotong University, Chongqing, China

Professional Experience

Associate Professor of Civil Engineering September 2012 – Present
Texas Tech University

Assistant Professor of Civil Engineering September 2006 – August 2012
Texas Tech University

Postdoctoral Fellow April 2005 – August 2006
Department of Civil Engineering
The Johns Hopkins University

Visiting Scholar August 2002 - August 2004
Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign

Selected Honors and Awards

Faculty Research Award 2010
Department of Civil and Environmental Engineering
Texas Tech University

Meyerhoff Fellowship 1999-2000
The Johns Hopkins University

Wufu-Zhenhua Scholarship
Department of Transportation, China

1999

RESEARCH PROJECTS

Sponsored by Federal Agencies:

- P1. Department of Energy
Optimization of Wind Turbine Performance (Announced, subcontract from Alstom Power, Inc.)
September 2014-August, 2015
PI: Delong Zuo, Co-PI: John Schroeder
Total Award of \$148,483 (50%)
- P2. National Science Foundation
Development of a Practical Model for Wind- and Rain-Wind-Induced Stay Cable Vibrations
September 2009 – August 2012
PI: Delong Zuo
Total Award of \$150,529 (100%)
- P3. National Science Foundation
Wind Tunnel Comparative Study
Co-PI: Douglas Smith, Co-PI: Delong Zuo
Total Award of \$20,000 (50%)
- P4. Department of Energy
Full-Scale Testing, Characterization, System Optimization & Demonstration of Grid Connected Wind Turbines & Wind Powered Water Desalination Project
September 2008-September 2012
Primary PI: Andy Swift/John Schroeder, Co-PI: Delong Zuo and multiple others
Total Award of \$5,871,000 (7%)

Sponsored by State Agencies:

- P5. Texas Department of Transportation
Fatigue Resistance and Reliability of High Mast Illumination Poles (HMIPs) with Pre-existing Cracks (Announced, subcontract from University of Houston)
September 2014 – August 2016
PI: Delong Zuo
Total Award of \$198,713 (100%)
- P6. Texas Department of Transportation
Development of Design Guidelines and Mitigation Strategies for Wind-Induced Traffic Signal Structure Vibrations
September 2010 – August 2014
PI: Delong Zuo, Co-PI: Xinzhong Chen

Curriculum Vitae

Total Award of \$459,465 (55%)

P7. Texas Department of Transportation

Testing of Alternative Support Materials for Portable Roll-up Signs Used in Maintenance Work Zones

September 2010 – August 2013

PI: Sangwook Bae, Co-PI: Delong Zuo and Derrick Tate

Total Award of \$321,508 (33%)

P8. Texas Department of Transportation

Monitoring of Pedestrian-Induced Vibration of Pedestrian Bridge No. 3 in Lubbock, TX

November 2008

PI: Delong Zuo, Co-PI: Kishor Mehta and Xinzhong Chen

Total Award of \$4,599 (60%)

Sponsored by Private Industry:

P9. Alstom Wind

Correlating Low-Level Atmospheric Wind Measurements with Wind Turbine Performance

April 2012 – January 2013

PI: Delong Zuo, Co-PI: John Schroeder

Total Award of \$95,000 (50%)

P10. NV Energy

Investigation of Wind-induced Vibration on a Tubular Guyed-V Transmission Structure

March 2012 – September 2012

PI: Douglas Smith, Co-PI: Delong Zuo and Stephen Morse

Total Award of \$183,327 (33%)

P11. Western Towers

An Exploratory Study for Retrofitting Tilt Towers for PTC Systems

March 2012 – May 2013

PI: Douglas Smith, Co-PI: Delong Zuo and Stephen Morse

Total Award of \$15,621 (33%)

P12. International Sign Association

International Sign Association Sign Testing - Phases 2B, 3 and 4

August 2011 – May 2012

PI: Kishor Mehta, Co-PI: Delong Zuo and Douglas Smith

Total Award of \$43,905 (60%)

P13. Outdoor Advertising Association of America

International Sign Association Sign Testing - Phases 2B, 3 and 4

October 2010 – May 2012

PI: Kishor Mehta, Co-PI: Delong Zuo and Douglas Smith

Total Award of \$61,715 (60%)

- P14. International Sign Association and Outdoor Advertising Association of America
Sign Tests in the Field and in the Wind Tunnel
August 2008 – December 2009
PI: Kishor Mehta, Co-PI: Delong Zuo and Douglas Smith
Total Award of \$61,258 (40%)

PUBLICATIONS

Archival Journal Articles:

- J1. Ding, J., Chen, X., Zuo, D. and Hua, J., "Fatigue life assessment of traffic-signal-support structures from analytical approach and long-term vibration monitoring data." *Journal of structural engineering*, accepted for publication.
- J2. Zuo, D., Smith, D.A. and Mehta, K.C. (2014), "Experimental study of wind loading of rectangular sign structures." *Journal of Wind Engineering and Industrial Aerodynamics*, 130: 62-74.
- J3. Christenson, R.E., Cashany, M., Hua, J. and Zuo, D. (2014), "Field testing of signal head vibration absorber mitigation device to reduce fatigue in wind-excited traffic signal support structures." *Transportation Research Record, Journal of the Transportation Research Board*, No. 2406, 42-48.
- J4. Smith, D.A., Zuo, D. and Mehta, K.C. (2014), "Characteristics of net force and torques on a rectangular sign measured in the field." *Journal of Wind Engineering and Industrial Aerodynamics*, 133: 80-91.
- J5. Zuo, D. (2014). "Full-scale measurement of wind pressure on the surface of an oscillating circular cylinders." *Journal of Wind Engineering and Industrial Aerodynamics*, 133, 65-79.
- J6. Liu, M., D. Zuo, and Jones, N.P. (2013). "Analytical and numerical study of deck-stay interaction in a cable-stayed bridge in the context of field observations." *Journal of Engineering Mechanics* 139(11): 1636-1652.
- J7. Zachry, B.C., Letchford, C.W., Zuo, D, and Kennedy, A.B. (2013), "Laboratory measurements of the drag coefficient over a fixed shoaling hurricane wave train." *Wind and Structures*. 16(2): 193-211.
- J8. Zuo, D., Hua, J. and Landuyt D.V. (2012), "A model of pedestrian-induced bridge vibration based on full-scale measurement." *Engineering Structures*, 45: 117-126.
- J9. Zuo, D., Letchford, C.W., and Wayne, S.P. (2011) "Wind tunnel study of wind loading on rectangular louvered panels." *Wind and Structures*, Vol. 14, No. 5: 449-463
- J10. Zuo, D. and Letchford, C.W. (2010). "Wind-induced vibration of a traffic-signal-support structure with cantilevered tapered circular mast arm." *Engineering Structures*, 32(10): 3171-3179.

- J11. Zuo, D. and Jones, N.P. (2010) "Interpretation of field observations of wind- and rain-wind-induced stay cable vibrations." *Journal of Wind Engineering and Industrial Aerodynamics*, 98(2): 73-87.
- J12. Zuo, D. and Jones, N.P. (2009) "Wind tunnel testing of yawed and inclined circular cylinders in the context of field observations of stay-cable vibrations." *Journal of Wind Engineering and Industrial Aerodynamics*, 97(5-6): 219-227.
- J13. Caracoglia L. and Zuo, D. (2009) "Effectiveness of cable networks of various configurations in suppressing stay-cable vibration." *Engineering Structures*, 31(12): 2851-2864.
- J14. Zuo, D., Jones, N. P., and Main, J. A. (2008) "Field observation of vortex- and rain-wind-induced stay-cable vibrations in a three-dimensional environment." *Journal of Wind Engineering and Industrial Aerodynamics*, 96(6-7): 1124-1133.
- J15. Hua, J., Zuo, D. and Chen, X., "Full-scale study of wind-Induced vibration of traffic signal support structures with a mast arm of circular or multi-sided cross-sections." *Engineering Structures*, under review.
- J16. Zuo, D., Wu, L., Smith, D. and Morse, S., "Experimental and Analytical Study of Galloping of a Slender Tower." *Engineering Structures*, under review.

Peer-Reviewed Conference Articles:

- C1. Xiao, J. and Zuo, D., "Conditional Simulation of Non-stationary Wind Field based on Discrete Wavelet Transform." 14th International Conference on Wind Engineering, Porto Alegre, Brazil, June, 2015, accepted
- C2. Zuo, D., Smith, D.A. and Morse, S.A., "Coupled Galloping of a Slender Tower with Distinct Natural Frequencies in Two Orthogonal Directions: Experimental Study." 14th International Conference on Wind Engineering, Porto Alegre, Brazil, June, 2015, accepted
- C3. Wu, L. and Zuo, D., "Coupled Galloping of a Slender Tower with Distinct Natural Frequencies in Two Orthogonal Directions: Experimental Study." 14th International Conference on Wind Engineering, Porto Alegre, Brazil, June, 2015, accepted
- C4. Christenson, R.E., Cashany, M., Hua, J. and Zuo, D., "Field Testing of the Signal Head Vibration Absorber Mitigation Device to Reduce Fatigue in Wind-Excited Traffic Signal Support Structures." Transportation Research Board 92nd Annual Meeting, Washington, D.C., USA, January, 2014
- C5. Hua, J. and Zuo, D., "Experimental investigation of wind-induced vibration of slender tapered cylinders." 12th Americas Conference on Wind Engineering, Seattle, WA, USA, June 2013.
- C6. Smith, D.A., Zuo, D. and Mehta, k.C., "Characteristics of net force and torques on a rectangular sign measured in the field." 12th Americas Conference on Wind Engineering, Seattle, WA, USA, June 2013.

Curriculum Vitae

- C7. Zuo, D., Xiao, J., Schroeder, J. L., Carcangiu, C. E. and Morse, J. C. "Correlating low-level atmospheric measurements with wind turbine performance." WINDPOWER 2013 Conference & Exhibition, Chicago, IL, USA, May 2013.
- C8. Hua, J. and Zuo, D., "Wind-induced vibration of mast arm traffic signal support structure of various configurations", 3rd American Association for Wind Engineering Workshop, Hyannis, MA, August 2012.
- C9. Zuo, D. and Xiao, J., "Characteristics of wind in stable boundary layers", 3rd American Association for Wind Engineering Workshop, Hyannis, MA, August 2012.
- C10. Zuo, D. and Hua, J., "Full-scale measurement of wind pressure on the surface of a circular cylinder." 7th International colloquium on Bluff Body Aerodynamics and Application, Shanghai, China, September 2012.
- C11. Zuo, D., Mehta, K.C. and Smith, D.A., "Benchmark wind tunnel study of wind loading on rectangular sign structures." 7th International colloquium on Bluff Body Aerodynamics and Application, Shanghai, China, September 2012.
- C12. Smith, D.A., Zuo, D. and Mehta, K.C., "Wind-induced force and torque on a sign measured in full- and model-scale." submitted to ATC-SEI Advances in Hurricane Engineering Conference, Miami, FL, USA, October, 2012.
- C13. McNeill, J. and Zuo, D., "Low-level jet characterization and implications for wind turbine inflow simulation." *13th International Conference on Wind Engineering*, July 2011, Amsterdam, the Netherlands.
- C14. Zuo, D. and McNeill, J., "Assessment of wind turbine loading based on conditionally simulated inflow wind field." *Engineering Mechanics Institute Conference*, June 2011, Boston, MA, USA.
- C15. Zuo, D., "Performance of a simply-supported reinforced concrete footbridge subjected to pedestrian loading." *International Symposium on Life-Cycle Performance of Bridges and Structures*, Changsha, China, June 2010.
- C16. McNeill, J. and Zuo, D. "Inhomogeneity of wind turbulence field: Implications for wind turbine inflow simulation." *WINDPOWER 2010 Conference & Exhibition*, Dallas, TX, USA, May 2010.
- C17. Zuo, D. "Wind-induced vibration of slender structures with tapered circular cylinders", *7th Asian Pacific Conference on Wind Engineering*, Taipei, Taiwan, November 2009.
- C18. Zachry, B.C., Letchford, C.W., Zuo, D., Schroeder, J.L., and Kennedy, A.B., "Surface drag coefficient behavior during hurricane Ike: Implications for the ASCE wind load standard and hurricane storm surge forecasting." *Proceedings for the Hurricane Hugo 20th Anniversary Symposium*, Charleston, SC, USA, October 2009.

- C19. Zuo, D. and Letchford, C.W., "Field observations of traffic signal structure vibration." *11th Americas Conference on Wind Engineering*, San Juan, Puerto Rico, June 2009.
- C20. Zachry, B.C., Letchford, C.W., Zuo, D., Schroeder, J.L., and Kennedy, A.B., "Surface drag coefficient behavior during hurricane Ike." *11th Americas Conference on Wind Engineering*, San Juan, Puerto Rico, June 2009.
- C21. Zuo, D., "Field observations of wind-induced lighting pole vibration." *1st Workshop of the American Association of Wind Engineers*, Vail, CO, USA, August 2008.
- C22. Caracoglia, L. and Zuo, D., "Towards the development of a rational design guideline for in-plane cable networks." *Inaugural International Conference of the Engineering Mechanics Institute*, Minneapolis, MN, USA, May, 2008: CD-ROM.
- C23. Caracoglia, L., Zuo, D., and Jones, N.P. "Dynamic analysis of a cable network with multiple dampers." *7th International Symposium on Cable Dynamics*, Vienna, Austria, December, 2007.
- C24. Zuo, D., Caracoglia, L., and Jones, N.P., "Assessment of cross-tie performance in mitigating wind and rain-wind-induced stay cable vibrations." *12th International Conference on Wind Engineering*, Cairns, Australia, July 2007: 903-910.
- C25. Liu, M.Y., Zuo, D., and Jones, N.P., "Deck-induced stay cable vibrations: Field observations and analytical model." *6th International Symposium on Cable Dynamics*, Charleston, SC, USA, September 2005: 175-182.
- C26. Zuo, D. and Jones, N.P., "Large amplitude dry cable vibration and its implication for rain-wind induced vibrations." *5th European Conference on Structural Dynamics*, Paris, France, September 2005: 367-372.
- C27. Zuo, D. and Jones, N.P., "The mechanism of rain-wind-induced vibration: vortex-shedding or galloping." *10th Americas Conference on Wind Engineering*, Baton Rouge, LA, USA, June 2005: CD-ROM.
- C28. Zuo, D., Jones, N.P., and Main, J.A., "Vortex- and rain-wind-induced stay cable vibrations in a three-dimensional environment." *5th International Colloquium on Bluff Body Aerodynamics and Applications*, Ottawa, Canada, July 2004: 397-400.
- C29. Zuo, D. and Jones, N.P., "Interpretation of observed damper performance in mitigating wind and rain-wind induced stay-cable vibrations." *11th International Conference on Wind Engineering*, Lubbock, TX, USA, June 2003: 2133-2140.

Non-Peer-Reviewed Conference Proceedings:

- C30. McNeill, J. and Zuo, D. "Inhomogeneity of wind turbulence field: implications for wind loading of wind turbines." *5th US-Japan Cooperative Program in Natural Resources Workshop on Wind Engineering*, Chicago, IL, USA, July 2010.

- C31. Jones, N.P. and Zuo, D. “Assessment of the performance of dampers and cross-ties in mitigating stay cable vibrations using full-scale measurement data.” *40th Panel Meeting of the Wind and Seismic Effects Committee of the US-Japan Cooperative Program in Natural Resources*, Gaithersburg, MD, May 2008.
- C32. Jones, N.P. and Zuo, D., “Understanding wind- and rain-wind-induced stay cable vibrations from field observations and wind tunnel tests” *4th US-Japan Cooperative Program in Natural Resources Workshop on Wind Engineering*, Tsukuba, Japan, July 2006.
- C33. Zuo, D. and Jones, N.P., “Understanding the mechanism of rain-wind-induced vibrations in the context of dry cable vibrations observed in the field and in the wind tunnel.” *Wind Induced Vibration of Cable Stay Bridges Workshop*, St. Louis, MO, USA, April 2006.

Research Reports:

- R1. Zuo, D., Smith, D. A. and Mehta, K. C., “Full-scale and wind tunnel study of wind loading on sign structures.” Final Report to: International Sign Association, Alexandria, VA, USA, and Outdoor Advertising Association of America, Washington, D.C. USA, March 2012.
- R2. Zuo, D., Smith, D. A. and Mehta, K. C., “Wind tunnel testing of signs: Study phases 2b, and 3.” Report to: International Sign Association, Alexandria, VA, USA, and Outdoor Advertising Association of America, Washington, D.C. USA, March 2012.
- R3. Zuo, D., Smith, D.A. and Mehta, K. C., “Field and wind tunnel testing of signs: Study phase 2a.” Report to: International Sign Association, Alexandria, VA, USA, and Outdoor Advertising Association of America, Washington, D.C. USA, March 2011.
- R4. Mehta, K. C., Smith, D. and Zuo, D., “Field and wind tunnel testing of signs: study phase 1.” Report to: International Sign Association, Alexandria, VA, USA, and Outdoor Advertising Association of America, Washington, D.C. USA, November 2010.
- R5. Zuo, D., “Monitoring of pedestrian-induced vibration of pedestrian bridge No. 3 in Lubbock, TX.” Report to: Texas Department of Transportation, Austin, TX, USA, November 2008.
- R6. Zuo, D. and Letchford, C.W., “Investigation of wind-induced highway lighting pole vibration using full-scale measurement.” Report to: Texas Department of Transportation, Austin, TX, USA, October 2007
- R7. Zuo, D. and Jones, N.P., “Stay-cable vibration monitoring of the Fred Hartman Bridge (Houston, Texas) and the Veterans Memorial Bridge (Port Arthur, Texas). “ Final report to: Texas Department of Transportation, Austin, Texas, and University of Texas at Austin, Austin, TX, USA, September 2005.
- R8. Jones, N.P. and Zuo, D., “Measurement of stay damping-Sunshine Skyway Bridge-Tampa, FL. “ Report to: Lendis Corporation, McLean, VA, USA and Federal Highway Administration, Washington, D.C., USA, March 2002.

INVITED TALKS:

- T1. Zuo, D., Wind Tunnel: An Infrastructure for Research, "Wind-Induced Loading and Vibration of Structures: Full-Scale and Wind Tunnel Studies," National University of Mexico, National University of Mexico. November, 2014
- T2. Zuo, D. "Wind-induced stay cable vibration and mitigation strategies." Bridge Committee meeting, Post-Tensioning Institute, Miami, FL, USA, October 2012
- T3. Zuo, D. "Wind-induced structural vibration and control." Chongqing Jiaotong University, China, September 2012
- T4. Zuo, D. "Wind-induced vibration of stay cables." Wuhan University of technology, China, June 2010
- T5. Zuo, D. "Understanding wind- and rain-wind-induced stay cable vibrations using full-scale measurements." Yokohama National University, Japan, December 2009.
- T6. Zuo, D. "Mitigation of wind- and rain-wind-induced stay cable vibrations." Honshu-Shikoku Bridge Expressway Co., Ltd., Japan, December 2009.
- T7. Zuo, D. and Jones, N.P., "Experience and lessons in full-scale measurement of structural vibrations." Bridge Dynamics and Monitoring Workshop, The Johns Hopkins University, Baltimore, MD, USA, October 2009.
- T8. Zuo, D., "Measurement and mitigation of bridge vibrations." Metropolitan Transit Authority of Harris County, Houston, TX, USA, April 2009.
- T9. Zuo, D., "Pedestrian-induced vibration of a foot-bridge." Caprock Branch, American Society of Civil Engineers, Lubbock, TX, USA, January 2009.
- T10. Zuo, D., "Field observations of wind- and rain-wind-induced stay cable vibrations." University of Strathclyde, Glasgow, Scotland, March 2008.
- T11. Zuo, D., "Wind- and rain-wind-induced stay cable vibrations." Northeastern University, Boston, MA, USA, October, 2006.
- T12. Jones, N.P. and Zuo, D., "Lessons learned from full-scale measurement of stay cable vibration." 6th International Symposium on Cable Dynamics, Charleston, SC, USA, September 2005.

TEACHING

Graduate Courses:

- Structural Dynamics I
- Structural Dynamics II

Curriculum Vitae

- Theory of Elastic Stability
- Advanced Mechanics of Solids

Undergraduate Courses:

- Dynamics
- Design of Engineering Systems (Structures Section)

STUDENT ADVISING

Current:

- Liang Wu, Ph.D. Student
- Jieying Hua, Ph.D. Student
- Jingting Xiao, Ph.D. Student

Graduated:

- Jason McNeill, Ph.D. May, 2012
- Brian Zachry, Ph.D. (Co-advised with Dr. Chris Letchford) August, 2009
- Alex Saez, MS December, 2012
- Mahesh Shrestha, MS July, 2008

PROFESSIONAL SERVICES

University Service:

- Member of the faculty senate, elected.
- Member of the faculty senate since Fall 2013 – Fall 2014
- Advisor of about 50 undergraduate students every semester since Fall 2008.
- Advisor/co-advisor of four PhD students and one MS student.
- A member of the search committee for two faculty candidates in structural engineering in Spring 2009.
- Member of the Curriculum, ABET and Scholarship Committees of the department.

State, National and International Committees and Panels:

- Member of the Technical Assistance Panel of Texas Department of Transportation.
- Participant on the Bridge Committee of Post-Tensioning Institute
- Participant on the Wind and Seismic Effects Committee of the US-Japan Cooperative Program in Natural Resources.

Other Services:

- Organizer, “Third United States–Japan Workshop on Structural Dynamics and Monitoring of Bridges and Other Flexible Structures against Wind Hazards”, March, 2012, Lubbock, TX, USA.
- Served as a chair for two sessions at the 11th Americas Conference on Wind Engineering in June 2009 in Puerto Rico.
- Served as a co-chair for session “Aerodynamics of other structures” at the 7th International Colloquium on Bluff Body Aerodynamics and Applications in September 2012 in Shanghai, China.
- Served as a reviewer for “Journal of Engineering Mechanics”, “Engineering Structures”, “Journal of Bridge Engineering”, “Journal of Fluids and Structures”, “Journal of Sound and Vibration”, “Journal of Structural Engineering”, “Journal of Wind Engineering and Industrial Aerodynamics”, “Journal of Wind Energy”, “Structural Health Monitoring” and “Wind and Structures.”