

ZHIHENG WANG

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EDUCATION

Ph.D. in Civil Engineering, 2017 – 2022

University of Southern California, Los Angeles, CA, U.S.

Dissertation: A Polynomial Chaos Formalism for Uncertainty Budget Assessment

Advisor: Professor Roger Ghanem

M.S. in Civil Engineering and Engineering Mechanics, 2014 – 2016

Columbia University, New York, NY, U.S.

Selected Courses: Earthquake and Wind Engineering, Structural Health Monitoring, Finite Element Analysis, Theory of Vibrations, Advanced Design of Concrete Structures, Advanced Design of Steel Structures, Uncertainty and Risk in Civil Infrastructure Systems, Elastic and Plastic Analysis of Structures.

B.E. in Wood Structural Engineering (First-class Honors), 2010 – 2014

Nanjing Forestry University, Nanjing, China.

Awarded “*China National Top Ten Graduates in Forestry*”

Visiting Undergraduate Student in Wood Science, 2013 – 2014

University of British Columbia, Vancouver, Canada.

PROFESSIONAL APPOINTMENTS

Assistant Professor, Department of Civil, Environmental, and Construction Engineering, Texas Tech University, 2023 – Present

Postdoctoral Fellow, University of Southern California, 2022 - 2023

Graduate Student Research Assistant, University of Southern California, 2017 - 2022

Research Intern, Sandia National Laboratories, Summer 2018

Research Associate, Shanghai Institute of Disaster Prevention & Relief, Tongji University, 2016 - 2017

Undergraduate Research Assistant, Nanjing Forestry University, 2011 - 2013

PUBLICATIONS

Refereed Journal Papers: (*corresponding author)

Wang, Z.* and Ghanem, R. (2023). Stochastic modeling and statistical calibration with model error and scarce data. *Computer Methods in Applied Mechanics and Engineering*, 416, 116339.

Wang, Z.*, Hawi, P., Masri, S., Aitharaju, V., and Ghanem, R. (2023). Stochastic multiscale modeling for quantifying statistical and model errors with application to composite materials. *Reliability Engineering and System Safety*, 235, 109213.

Wang, Z.*, and Ghanem, R. (2023). Stochastic framework for optimal control of planetary reentry trajectories under multilevel uncertainties. *AIAA Journal*, 1-12.

Yu, T., **Wang, Z.***, and Wang, J. (2023). An iterative augmented unscented kalman filter for simultaneous state-parameter-input estimation for systems with/without direct feedthrough. *Mechanical Systems and Signal Processing*, 205, 110793.

Yu, T., and **Wang, Z.*** (2023). Model updating of nonproportionally damped structural systems using an adapted complex sum-of-squares optimization algorithm. *Journal of Engineering Mechanics*, 149(8), 04023043.

Wang, Z.*, and Ghanem, R. (2022). A functional global sensitivity measure and efficient reliability sensitivity analysis with respect to statistical parameters. *Computer Methods in Applied Mechanics and Engineering*, 402, 115175.

Wang, Z.*, and Ghanem, R. (2021). An extended polynomial chaos expansion for PDF characterization and variation with aleatory and epistemic uncertainties. *Computer Methods in Applied Mechanics and Engineering*, 382, 113854.

Wang, Z.*, Xie, W., Lu, Y., Li, H., **Wang, Z.**, and Li, Z. (2019). Dynamic and static testing methods for shear modulus of oriented strand board. *Construction and Building Materials*, 216, 542-551.

Peng, Y., **Wang, Z.**, and Ai, X.* (2018). Wind-induced fragility assessment of urban trees with structural uncertainties. *Wind and structures*, 26(1), 45-56.

Wang, Z.*, Xie, W., **Wang, Z.**, and Cao, Y. (2018). Strain method for synchronous dynamic measurement of elastic, shear modulus and Poisson's ratio of wood and wood composites. *Construction and Building Materials*, 182, 608-619.

Wang, Z., Wang, Y., Cao, Y., and Wang, Z.* (2016). Measurement of shear modulus of materials based on the torsional mode of cantilever plate. *Construction and Building Materials*, 124, 1059-1071.

Wang, Z., Gao, Z., Wang, Y., Cao, Y., Wang, G., Liu, B., and Wang, Z.* (2015). A new dynamic testing method for elastic, shear modulus and Poisson's ratio of concrete. *Construction and Building Materials*, 100, 129-135.

Wang, Z., Wang, Z.*, Wang, B. J., Wang, Y., Liu, B., Rao, X., Wei, P., and Yang, Y. (2014). Dynamic testing and evaluation of modulus of elasticity (MOE) of SPF dimensional lumber. *BioResources*, 9(3), 3869-3882.

Refereed Conference Papers:

Wang, Z.*, and Ghanem, R. (2022). A polynomial chaos formalism for sensitivity and reliability analysis. Engineering Mechanics Institute Conference (EMI) 2022.

Wang, Z.*, and Ghanem, R. (2019). Stochastic sensitivities across scales and physics. Engineering Mechanics Institute Conference (EMI) 2019.

PATENTS

Patent Number: ZL201320079728.9 (China): **Wang, Z.**, Yang, X., Rao, X., Yang, J., Lin, X., and Bi, D., Device for testing elastic modulus of lumbers by frequency method, 2013.

Patent Number: ZL201320083126.0 (China): **Wang, Z.**, Yang, X., Rao, X., Zhuang, Z., Yang, J., Cao, Y., Bi, D., and Lin, X., Device for testing dynamic stiffness of band saw blade systems by acoustic methods, 2013.

HONORS AND AWARDS

First-place Best Student Paper Award in Probabilistic Methods, ASCE Engineering Mechanics Institute, 2022

Graduate School PhD Fellowship, University of Southern California, 2017 – 2018

China National Top Ten Graduates in Forestry (selected from all forestry graduates in China), State Forestry Administration of China, 2014

Winner, China National Student Competition of Timber Structural Design (group award), Chinese Academy of Forestry, 2014

Distinguished Student for Scientific and Technical Innovation, Nanjing Forestry University, 2013

China National Scholarship, Ministry of Education of China, 2012

TEACHING EXPERIENCE

Texas Tech University, Dept. of Civil, Environmental, & Construction Engineering

Lecturer

- CE-3340: Structural Analysis (undergraduate course), Fall 2023 and Spring 2024

University of Southern California, Sonny Astani Dept. of Civil & Environmental Engineering

Occasional lecturer

Taught lectures in absence of Postdoc advisor.

- CE-108: Introduction to Computer Methods in Civil Engineering (undergraduate course), Spring 2023
- CE-599: Data Analytics in Civil Engineering (graduate course), Spring 2023

PRESENTATIONS

Invited Talks:

Uncertainty quantification methods and algorithms for civil engineering, College of Civil Engineering, Southeast University, Nanjing, China, December 2023.

Uncertainty quantification and management in computational science and engineering, Department of Civil, Environmental, and Construction Engineering, Texas Tech University, Lubbock, TX, March 2023.

Model validation and analytical certification of composite material systems, 2nd Annual Materials Innovation & Advanced Technology Leadership Forum, Huntington Beach, CA, January 2023.

A framework for quantification of uncertainties and modeling errors in complex systems and its applications, Department of Civil and Environmental Engineering, University of Houston, Houston, TX, February 2022

Stochastic optimal control of hypersonic trajectories, Sandia National Laboratories, Livermore, CA, November 2021 (virtual).

Overview of polynomial chaos expansions, Machine learning and Uncertainty Quantification Seminar, University of Southern California, Los Angeles, CA, October 2021 (virtual).

Conference Presentations:

Bayesian model calibration under statistical and model errors based on polynomial chaos methodologies, Engineering Mechanics Institute Conference, Atlanta, GA, June 2023

A polynomial chaos formalism for sensitivity and reliability analysis, Engineering Mechanics Institute Conference, Baltimore, MD, June 2022

Hierarchical modeling for uncertainty quantification, 16th U.S. National Congress on Computational Mechanics, Chicago, IL, July 2021 (virtual conference)

Stochastic sensitivities across scales and physics, Engineering Mechanics Institute Conference, Pasadena, CA, June 2019

Towards stochastic modeling of tsunamis, Engineering Mechanics Institute International Conference, Shanghai, China, November 2018

PROFESSIONAL SERVICES AND ACTIVITIES

Professional Memberships:

- Member, Probabilistic Methods Committee, ASCE Engineering Mechanics Institute, 2023 – present
- Faculty, Wind Hazard and Infrastructure Performance Center (WHIP-C), NSF-IUCRC, 2023 – present
- Member, Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath) SciDAC-5 Institute, Office of Science, U.S. Department of Energy, 2019 – present
- ASCE Engineering Mechanics Institute (EMI)
- United States Association for Computational Mechanics (USACM)
- Society for Industrial and Applied Mathematics (SIAM)
- American Institute of Aeronautics and Astronautics (AIAA)

Professional Services:

Faculty Search Committee, CECE Department, Texas Tech University, 2024

Communications Committee, CECE Department, Texas Tech University, 2024

National Science Foundation (NSF) reviewer, 2023

Journal Reviewer:

- Computer Methods in Applied Mechanics and Engineering
- Mechanical System and Signal Processing
- Reliability Engineering & System Safety
- Structural and Multidisciplinary Optimization
- International Journal for Uncertainty Quantification
- International Journal of Structural Stability and Dynamics
- Journal of Renewable Materials
- Applied Sciences
- Bioresources

Other Appointments:

- China National Second-level Go Athlete.
- Founder and first president of Nanjing Forestry University Go Association.
- No. 1 men's player on the University of Southern California badminton team, 2017 – 2022.
- No. 1 men's player on the Columbia University badminton team, 2014 – 2016.
- No. 1 men's player on the Nanjing Forestry University Go team, 2010 – 2013.

SKILLS

Programming: Python, C++, MATLAB

Software: UQtk, Abaqus, ANSYS, Trilinos, SAP2000, ETABS, L^AT_EX, AutoCAD

Language Proficiency: Professional English, Native Chinese