Guangzhao Chen, Ph.D.

Assistant Professor
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National Wind Institute
Texas Tech University
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CECE 119

a. Research Interests

❖ **Performance-Based Design and Structural Resilience under Wind Hazards**
  ➢ **Experimental and Computational Analysis**: Integrating laboratory testing with full-scale computational simulations to optimize structural performance and adaptability under extreme wind, surge, and wave conditions.
  ➢ **AI/ML-Driven Hazard Modeling and Simulation:** Developing advanced AI/ML models to simulate, assess, and evaluate damage from wind hazards like tornadoes, hurricanes, and severe storms, enhancing predictive accuracy for resilient design.
  ➢ **Wind Hazard Damage Assessment:** Conduct field experiments with pre- and post-damage assessments to analyze real-world structural performance, advancing sustainable, resilient infrastructure design.
  ➢ **Resilience and Risk Mitigation:** Refining design codes and standards to support performance-based approaches and enhance community resilience through adaptive, risk-informed strategies for climate-intensified natural hazards.

b. Work Experience

Texas Tech University	Lubbock, TX
Assistant Professor	09/2025-*present*

NHERI Wall of Wind (WOW) Experimental Facility (EF),	
Extreme Events Institute, Florida International University,	Miami, FL
Postdoctoral Research Associate	09/2023-08/2025

c. Education

University of Illinois Urbana-Champaign — Champaign, IL
Ph.D. in Civil Engineering — 08/2018- 06/2023
Thesis: *Integrative Data-Driven Approaches to Tornado Wind Field Reconstruction*
Committee Chair: *Billie F. Spencer Jr., Professor, Foreign Member of the Chinese Academy of Engineering; Nathan M. & Anne M. Newmark Endowed Chair in Civil Engineering; Distinguished Member, American Society of Civil Engineers (ASCE)*
Advisor: *Franklin T. Lombardo, Ph.D.*

University of Illinois Urbana-Champaign — Champaign, IL
M.S. in Civil Engineering — 08/2017-06/2018
Advisor: *Franklin T. Lombardo, Ph.D.*

Dalian University of Technology — Liaoning, China
B.S. in Civil Engineering — 09/2013-06/2017

d. Research Funding

- ***Mid-scale RI-1 (M1:DP): National Full-Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events (NICHE)***

  NSF award number 2131961

  Main contributor: Design the parameters of NICHE; charge and conduct related experiments at WOW, WOPDT and SUSTAIN for informing and validating the designing parameters

- ***National Institute of Standards and Technology (NIST) project***

  NIST grant number 70NANB19H057

  Main contributor: Develop a mobile bluff-body to understand the characteristics of the full-scale vortex events and explore the numerical fluid dynamic vortex models

- ***Reconstruction of Four-Dimensional Near-Surface Wind Characteristics from Debris and Damage Attributes using Computer Vision***

  NSF award number 2053935

  Main contributor: Develop an aerodynamical debris trajectories model and apply machine learning technology in recognizing windborne debris

- ***Mid-scale RI-EW Concepts for a Tornado-Downburst-Gust Testing Facility to Study Wind/Debris Impact on Civil Infrastructure; Chicago, Illinois; 20-21 October 2022***

  NSF award number 2233640

  Participator: Contribute to the analysis of non-synoptic wind events

- ***NOAA National Severe Storms Laboratory (NSSL) The Verification of the Origins of Rotation in Tornadoes Experiment-Southeast project***

  VORTEX-SE

  Main contributor: Analyze the characteristics of tornado events.

- ***StEER 21-22 March 2022 Tornado Outbreak project***

  PRJ-3443

  Participator: Investigate the tornado damage for March 2022 Tornado Outbreak

- ***ZJU-UIUC Wind-induced Debris Research Project***

  Main contributor: Develop the CFD analysis of windborne debris.

- ***EDP Renováveis Company Project***

  Main contributor: Develop software for rapidly extracting and detecting thunderstorm records from Automated Surface/Weather Observing Systems (ASOS) wind time history data to establish a wind hazard database.

e. Professional Activities

Instructor

- **Texas Tech University**   Fall 2025
  Course: *Dynamics*

Teaching Assistant

- **University of Illinois Urbana-Champaign**　　　　　Spring 2018, Spring 2020
  Course: *Steel Structures I*

Reviewer

- Journal of Wind Engineering and Industrial Aerodynamics (JWEIA)
- Journal of Structural Engineering (JSE)
- Journal of Computational Methods in Sciences and Engineering (JCMSE)
- Journal of Earth Science & Climatic Change (JESCC)
- Frontiers in Built Environment
- Remote Sensing
- Drone
- Natural Hazards (NHAZ)

f. Publications

Journal papers

Chen, G., & Lombardo, F. T. (2025, Submitted). A three-dimensional tornadic field model based on the simplified Navier-Stokes Equations and full-scale dust-devil data. *Journal of Wind Engineering and Industrial Aerodynamics.*

Xinyang, Wu., **Chen, G.,** (2025, Submitted). Community Loss Analysis for Tornado Events Using Residential Building Footprints. *Advances in Wind Engineering.*

Chen, G., & Lombardo, F. T. (2025, Submitted). Reconstruction method of near-surface tornadic field based on windborne debris. *Journal of Wind Engineering and Industrial Aerodynamics.*

Roueche, D.B., **Chen, G.,** Soto, M.G., Kameshwar, S., Safiey, A., Do, T., Lombardo, F.T., Nakayama, J.O., Rittelmeyer, B.M., Palacio-Betancur, A., Demaree, G., (2024). Performance of Hurricane-Resistant Housing during the 2022 Arabi, Louisiana, Tornado. *J. Struct. Eng.* 150, 04024029.

Lombardo, F. T., Zaldiva de Alba, A., **Chen, G.,** Rhee, D., Nevill, J. B., Wienhoff, Z., (2023) An atmospheric vortex and its induced loading on a bluff body. *Journal of Wind Engineering and Industrial Aerodynamics*, *243,105605*. DOI:10.1016/j.jweia. 2023.105605.

Chen, G., & Lombardo, F. T. (2020). An automated classification method of thunderstorm and non-thunderstorm wind data based on a convolutional neural network. *Journal of Wind Engineering and Industrial Aerodynamics*, *207*, 104407. DOI:10.1016/j.jweia.2020.104407

Chen, G., & Lombardo, F. T. (2019). An analytical pattern-based method for estimation of a near-surface tornadic wind field. *Journal of Wind Engineering and Industrial Aerodynamics*, *194*, 103999. DOI:10.1016/j.jweia.2019.103999

Ouyang, J., Han, B., **Chen, G.,** Zhao, L., & Ou, J. (2018). A viscosity prediction model for cement paste with nano-SiO2 particles. *Construction and Building Materials*, *185*, 293–301. DOI:10.1016/j.conbuildmat.2018.07.070

Conference papers

Chen, G., Lombardo, F. T., & Roueche, D.,(2023). A tornadic field retrieval method based on wind-induced debris video-analysis. *16th Int. Conf. on Wind Engineering (ICWE)*.

Khaled, F., **Chen, G.,** & Lombardo, F. T.,(2023). An innovative computational approach to generate tornadolike vortices using large eddy simulation (LES). *16th Int. Conf. on Wind Engineering (ICWE)*.

Chen, G., & Lombardo, F. T., (2023). A physics-based approach to estimate wind speed from wind-borne debris flight trajectory. *ASCE 2023 Engineering Mechanics Institute Conference (EMI 2023)*.

Chen, G., Lombardo, F. T., & Zaldivar de Alba, A., (2022). A full-scale wind-induced debris simulation under a recorded dust devil event. *14th Americas Conference on Wind Engineering*.

Chen, G., Lombardo, F. T., & Zaldivar de Alba, A., (2022). A translational wind field estimation method for limited in-situ observations. *14th Americas Conference on Wind Engineering*.

Chen, G., & Lombardo, F. T. (2021). Computational methods of windborne debris trajectories in a near-surface tornadic field. *6th American Association for Wind Engineering Workshop (Online)*.

Chen, G., Lombardo, F. T., & Weinhoff, Z (2020). Computational methods of windborne debris trajectories in an estimated near-surface tornadic field. *BBAA IX (Canceled)*.

Chen, G., & Lombardo, F. T. (2019). A revised automated classification method of thunderstorm and non-thunderstorm wind data based on a neural network. *15th Int. Conf. on Wind Engineering (ICWE)*.

Chen, G., & Lombardoa, F. T. (2019). An analytical method for pattern-based estimation of a near-surface wind field. *15th Int. Conf. on Wind Engineering (ICWE)*.

Chen, G., & Lombardo, F. T. (2018). A numerical pattern based method for estimation of a near-surface tornadic wind field. *5th American Association for Wind Engineering Workshop*.

Zaldivar de Alba, A., Lombardo, F. T., Nevill, J. B., Zickar, A. S., Lopez, J., & **Chen, G.** (2018). Development of novel wind engineering instruments. *Tornado Hazard Wind Assessment and Reduction Symposium*.