# Faiaz Khaled, Ph.D.

Assistant Professor *Faiaz.khaled@ttu.edu*
Texas Tech University (TTU) *2252520858*

## EDUCATION

**Doctor of Philosophy, Civil Engineering (Structural)** August, 2017-
**Master of Science (Non-thesis), Civil Engineering (Structural)** August, 2022
Louisiana State University (LSU), Baton Rouge, LA, USA

- Dissertation title: "Aerodynamics of Low-Rise Buildings: Large-Scale (Open Jet) Testing and CFD Simulation"
- Supervisor: Dr. Aly Mousaad Aly
- Committee members: Dr. Clinton Willson, Dr. Barry D. Keim, Dr. Steve C.S. Cai

*Synopsis (Research):*

- CFD simulation of wind flow over low-rise buildings to investigate computational efficiency of LES and Hybrid RANS-LES models (used OpenFOAM and high-performance computing (HPC))
- Predicting scouring around bridge piers using CFD simulations (used Ansys Fluent).
- Estimation of mean and peak wind loads on large-scale Silsoe cube model (1:10 and 1:5 scale).
- Estimation of mean and peak wind loads on large-scale Texas Tech University (TTU) flat-roof building model (1:10 and 1.7.5 scale).
- Aerodynamic testing of a large-scale tall building.

*Related coursework:* Advanced Fluid Mechanics, Aerodynamics, Wind Engineering, Structural Control, Advanced Concrete Theory, Limit States and Plastic Design, Advanced Bridge Engineering.

**Bachelor of Science, Civil Engineering** March, 2011-
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh March, 2016

## RESEARCH INTERESTS

*Research Avenues*

- Building aerodynamics
- Enhancing the safety and comfort of buildings during extreme wind events
- Wind characterization based on near-ground measurement of extreme wind events
- Understanding the effects of climate change on the built environment
- Harnessing wind energy in urban areas

*Expertise*

- Aerodynamic experiments in the boundary layer wind tunnels and open jet facilities
- Numerical simulation (Standalone CFD and integration of CFD and Machine learning)
- Field measurements of extreme wind events

## PROFESSIONAL APPOINTMENT

Assistant Professor at *Texas Tech University (TTU)* — September 2024-Present
- Teaching 'Introduction to Atmospheric Science'
- Capturing the features of non-stationary winds in straight line wind simulators (proposal preparation and publication)

Postdoctoral Research Associate at the *University of Illinois Urbana Champaign (UIUC)* — Sept. 2022-August 2024
- Supervisor: Dr. Franklin Lombardo

*Research Thrust Areas:*
- Developing a facility to study the combined effects of powerful winds and waves (NICHE-MsRI project funded by NSF)
- Creating tornado-like flow in straight-line wind simulators using CFD simulations
- Large-scale aerodynamic experiments in wind tunnels and open jet facilities
- Field investigation of hurricanes, tornadoes, and dust devils
- Post-disaster damage survey and forensics

Graduate Research Assistant, LSU — August, 2017-August, 2022
- Computational Fluid Dynamics (CFD) simulation of wind-flow
  - Experience with using OpenFOAM to improve the prediction of aerodynamic loads on low-rise buildings in realistic flow conditions.
  - Addressing the issue of higher computational cost associated with CFD simulations in building aerodynamics at higher Reynolds numbers.
- Aerodynamic testing of large-scale buildings in the LSU open-jet facility
  - Building aerodynamic models, and instrumenting models with sensors.
  - Experience with velocity and pressure measuring instrumentation.
  - Analyzing experimental data.
- Investigating scouring around bridge piers using Ansys Fluent.

## SELECTED PUBLICATIONS

***Book chapter***
- Aly Mousaad Aly, **Md Faiaz Khaled**, Hamzeh Gol-Zaroudi. "Aerodynamics of Low-Rise Buildings: Challenges and Recent Advances in Experimental and Computational Methods." Aerodynamics, Accepted, InTech, 2020. DOI: 10.5772/intechopen.92794a.

***Peer-reviewed journal (Published)***
- **Faiaz Khaled**, Franklin T. Lombardo, Kurtis Gurley, Modeling of vortices in straight-line wind simulators, Journal of Wind Engineering and Industrial Aerodynamics, Volume 257, 2025, 105992, ISSN 0167-6105, https://doi.org/10.1016/j.jweia.2024.105992
- **Khaled, M.F.**, Aly, A.M., Elshaer, A. (2021), "Computational Efficiency of CFD Modeling for Building Engineering: An Empty Domain Study," Journal of Building Engineering, 102792.
- **Khaled, M.F.**, Aly, A.M. Assessing aerodynamic loads on low-rise buildings considering Reynolds number and turbulence effects: a review. Adv. Aerodyn. 4, 24 (2022). https://doi.org/10.1186/s42774-022-00114-0
- Aly Mousaad Aly, **Md Faiaz Khaled**, Ryan Clancy,Large-Scale Open-Jet Testing: A new frontier in structural wind Engineering, Engineering Structures, Volume 266, 2022, 114567, ISSN 0141-0296, https://doi.org/10.1016/j.engstruct.2022.114567.

- Aly Mousaad Aly, **Md. Faiaz Khaled**; Open-jet testing: Investigating turbulence and geometric scale effects on surface pressures in the atmospheric boundary layer. Physics of Fluids 1 December 2024; 36 (12): 125141. https://doi.org/10.1063/5.0231093
- **Khaled, Md. F**, Aly, A.M. (2023), "Augmenting external surface pressures' predictions on isolated low-rise buildings using CFD simulations," Wind and Structures, 37(4), 255-274. https://doi.org/10.12989/was.2023.37.4.255
- Aly, A. M., & **Khaled, F.** (2023). Optimizing Pier Design to Mitigate Scour: A Comprehensive Review and Large Eddy Simulation Study. Journal of Applied Fluid Mechanics, 16(7), 1296-1315. doi: 10.47176/jafm.16.07.1691.

***Peer-reviewed journal (Under review/in preparation)***

- Mohammad Abid Hasan, **Faiaz Khaled,** Franklin Lombardo, "Generation of tornado-like vortices (TLVs) in straight-line wind simulators using moving louvers in large eddy simulations (LES)".
- **Faiaz Khaled**, Franklin Lombardo, "Induced loading from vortex generated in a straight-line wind tunnels"

***Peer-reviewed conference abstracts and papers***

- **Faiaz Khaled,** Franklin Lombardo, (2024), "Generating tornado-like vortices in straight-line wind simulators", 9th International Colloquium on Bluff Body Aerodynamics and Applications, University of Birmingham, UK.
- **Faiaz Khaled,** Guangzhao Chen, Franklin Lombardo, (2023), "An innovative computational approach to generate tornado-like vortices using large eddy simulation (LES)", 16th International Conference on Wind Engineering, Florence, Italy.
- **Khaled, M.F**., Aly, A.M., (2021), "On the computational efficiency of LES and hybrid RANS-LES models in building aerodynamics", 6th American Association for Wind Engineering Workshop (online), Clemson University, Clemson, SC, USA.
- Aly, A.M., **Khaled, M.F**., (2021), "Aerodynamics of low-rise buildings: large-scale open-jet testing to address Reynolds number effects", 6th American Association for Wind Engineering Workshop (online), Clemson University, Clemson, SC, USA.
- M.M.Sifat[1], **M. F.Khaled[1],** A.B.Emon[2], S.Iffat[2] (2015) "Lateral deflection of shear-wall frame structure: a parametric study with component stiffness method and finite element method". UKIERI (UK-India Education and Research Initiative) concrete congress 2015.

## SCIENTIFIC PRESENTATIONS

- **Dr. Faiaz Khaled**, Dr. Franklin T. Lombardo. (August, 2023). "Modeling of Tornado-Like Vortices in Straight-Line Wind Simulators." Presented at Tornado Hazard Wind Assessment and Reduction Symposium (THWARTS, 2023), Champaign, Illinois.
- **Dr. Faiaz Khaled**, Dr. Guangzhao Chen, Dr. Franklin T. Lombardo. (August, 2023). *"Proposing an alternate computational approach to generate tornado-like vortices using large eddy simulation (LES)."* Presented at 16th ICWE International Conference on Wind Engineering, Florence, Italy.
- **Faiaz Khaled**, Suvash Chapain, Dr. Aly Mousaad Aly. (April, 2019). "*Wind Engineering for Resilient, Smart and Eco-Friendly Infrastructure.*" Presented at 2019 Annual Spring Meeting & Conference, Shreveport, Louisiana.
- **Md Faiaz Khaled,** Dr. Aly Mousaad Aly. (March, 2018). "Challenges Associated with Predicting Impact of Wind on Low Rise Buildings." Presented at 7th Annual Graduate Student Research Conference, Baton Rouge, Louisiana.

## INVITED TALKS

- **Dr. Faiaz Khaled**, Dr. Franklin T. Lombardo. (October, 2023). *"Unconventional techniques to model vortex characteristics of transient wind events."* Presented at Eighth SIAM Central States Section Annual Meeting, Lincoln, Nebraska.

## WORKSHOP INVITATIONS

- *"Advancement in Computational Wind Engineering"* – Workshop Report NIST Grant Contractor Report – NIST GCR 23-047 (https://doi.org/10.6028/NIST.GCR.23-047)
- *"Mid-scale RI-EW: Concepts for a Tornado-Downburst-Gust Testing Facility to Study Wind/Debris Impact on Civil Infrastructure"*- Funded by NSF

## AWARDS

- Awarded with CEE graduate student enrichment stipend for 5 years at LSU.

## FUNDING

*Startup fund at TTU*

- Generous startup fund awarded from TTU to develop independent research program, and support graduate students.

*Postdoctoral research project*

- National Full-Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events (NICHE) project; funded by NSF (award no. 2131961).
- Role: Postdoctoral researcher
- Tasks:
    - Developing a facility to study the combined effects of powerful winds and waves (NICHE-MsRI project funded by NSF)
    - Creating tornado-like flow in straight-line wind simulators using CFD simulations
    - Collaborated with the University of Florida Wind tunnel team to conduct experiments to validate CFD results.

*Doctoral research project*

- Funded by Louisiana Board of Regents (LEQSF (2022-25)-RD-B-02, LEQSF (2021-22)-RD-A-30) and LSU NSF I-Corps.
- Role: Graduate Research Assistant
- Tasks:
    - Ensuring accurate atmospheric boundary layer flow experimentally and numerically.
    - Conducting CFD simulation of wind flow around buildings.
    - Large-scale aerodynamic testing of buildings in wind tunnels.

*Travel grant*

Awarded travel funding for participating in the following workshops and conferences

- NHERI Lehigh Researcher Workshop--funded by NSF
- "Advancement in Computational Wind Engineering" workshop--funded by NIST at ASCE headquarters
- Eighth SIAM Central States Section Annual Meeting

*Proposal submission experience (during postdoc appointment)*

- NSF Trailblazer Engineering Impact Award (TRAILBLAZER) (*Ongoing proposal*); PI: Dr. Franklin Lombardo.
    - Role: Postdoctoral scholar
- Project Title: "Improving the Safety and Comfort of Pedestrians and Harnessing Wind Energy on the University of Illinois Campus"; PI: Dr. Franklin Lombardo.
    - Role: Postdoctoral scholar
- Mistletoe Research Fellowship
- Structural Engineers Foundation Research Grant application 2022-2023

## AREAS OF TEACHING EXPERTISE

*Confident about teaching the following topics:*

- Introduction to Atmospheric Science
- Severe weather
- Structural analysis
- Concrete structure design
- Analysis of indeterminate structures
- Finite element method
- Fluid mechanics
- Steel structure design
- Effects of climate change on the built environment
- Structural wind engineering
- Computational wind engineering (CFD and Machine learning)
- Surveying
- Building aerodynamics
- Structural dynamics
- Structural control

## TEACHING EXPERIENCE

***Experience as an instructor*** January, 2019- Decemeber, 2021

Louisiana State University (LSU)

CE 3500 (Surveying): Instructor of lab sessions

CE 4400 (Principles of Steel Design): Guest instructor

University of Illinois Urbana Champaign (UIUC)

CEE 473(Wind Effects on Structures): Guest Instructor of Computational Wind Engineering (CWE) — Fall, 2023

***Experience as a teaching assistant*** January, 2019- Decemeber, 2021

Louisiana State University (LSU)

Courses: CE 4400 (Principles of Steel Design), CE 3500 (Surveying)

- Graded exams and homework.
- Designed homework problems.
- Demonstrated the use of surveying laboratory instruments.
- Designed online lab sessions by making videos.
- Proctored mid-term and final exams.
- Officiated discussion and brainstorming sessions.

## MENTORING

Louisiana State University (LSU) Spring, 2018-Spring, 2022

- Ryan Clancy, Undergraduate student, CEE
  - Mentoring area: Experimental research and presentation
- Matthew Thomas, MS student, CEE
  - Mentoring area: Experimental research
- Nader Yousef, MS student, CEE
  - Mentoring area: Constructing building model, instrumenting, and data processing
- Erin Dougherty, MS student, CEE
  - Mentoring area: Computational research with CFD
- Jennifer Whipple, MS student, CEE
  - Mentoring area: Computational research with CFD

University of Illinois Urbana Champaign (UIUC)

- Youngchan Lee, MS student, CEE Fall, 2022-Fall, 2023
- Badi Seioshanseian, MS student, CEE
- Mehtab Azhar, MS student, CEE
  - Mentoring area: Conducting CFD simulation for their course project.
- Sung Min Moon, Phd Student, CEE
- David Roegner, MS student, Atmospheric Sciences
  - Mentoring area: Providing suggestions and ideas on experimental and computational wind engineering research.

## INDUSTRY EXPERIENCE

Technical Intern at *Arcadis* May, 2021-August, 2021

- Worked on the design of hydraulic structures (e.g., Canal Gate in a river)
- Modeling and analysis of structures in Staad Pro
- Writing design-related reports and calculations (using Mathcad)
- Stability analysis of old hydraulic structures

## SOFTWARE AND PROGRAMMING EXPERTISE

- Drafting software: Autocad, Microstation, Fusion 360
- Computational Fluid Dynamics (CFD) simulations: OpenFOAM, Ansys Fluent
- Programming Language: Matlab, Python, C++.
- Structural Analysis and Design (Finite Element): ANSYS, ETABS, SAP, Staad Pro, Revit.

## SERVICE AND PROFESSIONAL DEVELOPMENT

- Participation in the workshop series for the new Developing Equity-Minded Engineering Practitioners (DEEP) Center (NSF Award #2308531) to help foster equitable and inclusive teaching and learning environments for students.
  - Learning from the experiences shared by faculty members.
  - Providing ideas for improving and promoting ‘inclusive teaching’.
- Reviewing Journal articles

  - Reviewed two journal articles from the "Journal of Wind Engineering and Industrial Aerodynamics"
  - One journal article from the "International Journal of Sustainability in Higher Education"
- Assisted in organizing the Tornado Hazard Wind Assessment and Reduction Symposium (THWARTS, 2023) conference.
- Served as the 'president' and 'general secretary' of student organizations to promote diversity and cultural exchange on the university campus.