Faiaz.khaled@ttu.edu

Faiaz Khaled, Ph.D.

Assistant Professor Texas Tech University (TTU)

EDUCATION

Doctor of Philosophy, Civil Engineering (Structural) Master of Science (Non-thesis), Civil Engineering (Structural) 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

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

March, 2011-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

August, 2017-August, 2022

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RESEARCH EXPERIENCE

Postdoctoral Research Associate at the University of Illinois Urbana ChampaignSept. 2022-
Present• Supervisor: Dr. Franklin LombardoPresent

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
- Making CFD simulations more efficient using Machine learning (ML)
- 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
- Harnessing wind energy in Urban and Sub-Urban areas

Graduate Research Assistant, LSU

- 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)

- 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.
- 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.

August, 2017-August, 2022

Peer-reviewed journal (Under review/in preparation)

- Aly Mousaad Aly, **Faiaz Khaled**, "Large-scale open-jet testing of the Texas Tech University (TTU) experimental building" [Under review in Physics of fluids]
- Faiaz Khaled, Franklin T. Lombardo, Kurtis Gurley, "Modeling of vortices in straight-line wind simulators" [Under review in Journal of Wind Engineering and Industrial Aerodynamics].
- **Faiaz Khaled**, Guangzhao Chen, Franklin Lombardo, "An innovative computational approach to generate tornado-like vortices using large eddy simulation (LES)".

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.Sifat¹, **M. F.Khaled¹**, A.B.Emon², S.Iffat² (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 (<u>https://doi.org/10.6028/NIST.GCR.23-047</u>)
- "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

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.
 - \circ $\,$ Conducting CFD simulation of wind flow around buildings.
 - \circ 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.
 - o Role: Postdoctoral scholar
- Mistletoe Research Fellowship
- Structural Engineers Foundation Research Grant application 2022-2023

AREAS OF TEACHING EXPERTISE

Confident about teaching the following topics:

- 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

<i>Experience as an instructor</i> 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)	January, 2019- Decemeber, 2021
CEE 473(Wind Effects on Structures): Guest Instructor of Computational Wind Engineering (CWE)	Fall, 2023
 <i>Experience as a teaching assistant</i> 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 	January, 2019- Decemeber, 2021
 Louisiana State University (LSU) 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 data processing 	Spring, 2018- Spring, 2022 g, and

• 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
- 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

- 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.

Fall, 2022-Fall, 2023

May, 2021-August, 2021