Fei Ding, PhD Candidate

NatHaz Modeling Laboratory
Dept. of Civil & Environmental Engineering & Earth Sciences
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Research Interests

- Wind Effects on Structures; Urban Wind Environments; Cyber-physical System; Computational Fluid Dynamics; Uncertainty Quantification; Data Assimilation and Machine Learning

Education

2014 – present
- **Ph.D. University of Notre Dame**, Notre Dame, IN
  Major: Civil Engineering; **Minor**: Computational Engineering
  Thesis: Morphing structural profile to urban wind environments
  GPA: 3.9/4.0

2011 – 2013
- **M.Phil. Hong Kong University of Science and Technology**, Hong Kong, China
  Major: Civil Engineering
  Thesis: Optimization-based approach for wind tunnel derived load combinations of tall buildings
  GPA: 4.0/4.0

2007 – 2011
- **B.Eng. Zhejiang University**, Hangzhou, China
  Major: Civil Engineering
  GPA: 3.7/4.0 **Major GPA**: 3.9/4.0
  Outstanding Graduate Student Thesis in Zhejiang University

Research Experience

2014 – present
- **Graduate Research Assistant**. Dept. of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame
  - Developed computational platform for aerodynamic shape tailoring of tall buildings using computational fluid dynamics (CFD)
  - Established uncertainty quantification (UQ) framework for aerodynamic shape design of buildings under uncertainty
  - Contributed implementations of parallel computing using CPUs and GPUs in CFD
  - Enabled multi-fidelity surrogate modeling for aerodynamic shape tailoring of tall buildings
  - Devised sequential experimental design for multi-fidelity surrogate models
  - Developing cyber-physical sensing, control and actuation system for autonomous morphing of structural form under winds

2013 – 2014
- **Research Assistant**. CLP Power Wind/Wave Tunnel Facilities, Hong Kong University of Science and Technology
  - Involved wind tunnel experiments of structures and topographic studies
  - Implemented optimization-based approach for determining wind tunnel derived design loads of tall buildings

Research Experience (continued)

2011 – 2013 **Graduate Research Assistant**. Dept. of Civil and Environmental Engineering, Hong Kong University of Science and Technology
- Established optimization-based approach for wind tunnel derived load combinations of tall buildings
- Performed sizing and topology optimization of wind-excited tall buildings
- Investigated extreme value analysis of design wind loads of structures

2010 – 2011 **Undergraduate Research Assistant**. Dept. of Civil Engineering, Zhejiang University
- Investigated human-induced vibrations of a long-span structure

Teaching Experience

2014 – present **Graduate Teaching Assistant**, University of Notre Dame
Undergraduate courses: Civil Engineering Materials; Introduction to Structural Engineering; Transportation Engineering
Graduate courses: Structural Dynamics

2011 – 2013 **Graduate Teaching Assistant**, Hong Kong University of Science and Technology
Undergraduate courses: Design of Structural Systems; Structural Analysis; Structural Steel Design
Graduate courses: Computer-aided Structural Optimization; Wind Effects on Structures

Selected Awards and Honors

2019 **MIT Rising Stars**, by Civil and Environmental Engineering at MIT.

O. H. Ammann Research Fellowship, by American Society of Civil Engineers (ASCE).

Best Student Paper Award - 5 awarded from over 200 participants, by 15th International Conference on Wind Engineering (ICWE15).

2018 **Thornton Tomasetti Student Innovation Fellowship**, by Thornton Tomasetti Foundation.

2017 **Selected Student Poster Presentation in the 3rd Global Grand Challenges Summit (GGCS)**, by US National Academy of Engineering (NAE), UK Royal Academy of Engineering (RAE) and Chinese Academy of Engineering (CAE). Washington, DC.

IASSAR Student Travel Scholarship, by International Association for Structural Safety and Reliability (IASSAR).

2016-2019 **Conference Presentation Grant**, by University of Notre Dame.

Professional Development Award, by University of Notre Dame.

2011-2013 **Graduate Research Scholarship**, by Hong Kong University of Science and Technology.

2011 **Academic Excellent Student Scholarship**, by Zhejiang University.

Publications

Journal Publications

1 **Ding, F.** & Kareem, A. (2019). Tall buildings with dynamic façade under winds. *Engineering*, Under review.

2 **Ding, F.**, Kareem, A. & Wan, J. (2019). Aerodynamic tailoring of structures using computational fluid dynamics. *Structural Engineering International*, *29*(1), 26–39.

3. **Ding, F.** & Kareem, A. (2018). A multi-fidelity shape optimization via surrogate modeling for civil structures. *Journal of Wind Engineering and Industrial Aerodynamics*, *178*, 49–56.

4. **Ding, F.**, Zhao, Y., Yang, X., Zhou, P. & Lin, Y. (2012). Serviceability analyses for a sightseeing galley on the steel roof of a stadium under human-induced vibrations. *Journal of Building Structure*, *42(8)*, 8–11.

Peer-Reviewed Conference Proceedings

1. **Ding, F.** & Kareem, A. (2019). Autonomous morphing of structural form under winds, In *Proceedings of the 15th International Conference on Wind Engineering (ICWE15)*, Beijing, China.

2. **Ding, F.** & Kareem, A. (2019). Generation of inflow velocity field for CFD analyses using GPUs, In *Proceedings of the 15th International Conference on Wind Engineering (ICWE15)*, Beijing, China.

3. **Ding, F.** & Kareem, A. (2019). Aerodynamic shape tailoring of buildings: A fusion of CFD, stochastics, machine learning and beyond, In *Proceedings of the 2019 International Association for Bridge and Structural Engineering (IABSE) Congress*, New York City, NY.

4. **Ding, F.** & Kareem, A. (2018). Sequential surrogate modeling for aerodynamic shape tailoring of tall buildings using multi-fidelity CFD simulations, In *Proceedings of the 7th International Symposium on Computational Wind Engineering (CWE2018)*, Seoul, Korea.

5. **Ding, F.** & Kareem, A. (2018). Inflow and model-form uncertainty quantification in CFD-enabled aerodynamic shape optimization, In *Proceedings of the 7th International Symposium on Computational Wind Engineering (CWE2018)*, Seoul, Korea.

6. **Ding, F.**, Kareem, A. & Spence, S. M. J. (2017). Inflow uncertainty propagation and quantification in CFD-based aerodynamic shape optimization of civil structures, In *Proceedings of the 12th International Conference on Structural Safety and Reliability (ICOSSAR)*, Vienna, Austria.

7. **Ding, F.**, Kareem, A. & Spence, S. M. J. (2017). A multi-fidelity model calibration approach for shape optimization of civil structures, In *Proceedings of the 7th European-African Conference on Wind Engineering (EACWE)*, Liège, Belgium.

8. **Ding, F.**, Kareem, A. & Spence, S. M. J. (2016). Multi-fidelity surrogate modeling for shape optimization of civil structures, In *Proceedings of the 4th American Association for Wind Engineering Workshop (AAWE)*, Miami, Florida.

9. **Ding, F.**, Spence, S. M. J. & Kareem, A. (2016). Optimizing the aerodynamics of bluff bodies using CFD-based surrogate modeling, In *Proceedings of the 8th International Colloquium on Bluff Body Aerodynamics and Applications (BBAA)*, Boston, Massachusetts.

10. **Ding, F.**, Spence, S. M. J. & Kareem, A. (2016). The role of aerodynamics in performance-based design, In *Proceedings of the 8th International Colloquium on Bluff Body Aerodynamics and Applications (BBAA)*, Boston, Massachusetts.

11. **Ding, F.**, Chan, C. M. & Tse, K. T. (2014). A novel optimization approach for determining wind tunnel derived load combinations for tall buildings, In *Proceedings of the 2014 World Congress on Advances in Civil, Environmental and Material Rsearch*, Busan, Korea.

Conference Presentations

1. **Ding, F.** & Kareem, A. (2019). *Autonomous morphing of structural form under winds*, Cambridge, MA, *MIT Rising Stars Workshop*.

2. **Ding, F.** & Kareem, A. (2019). *Inflow and model-form uncertainty quantification in CFD-enabled aerodynamic shape optimization*, Pasadena, CA, *Proceedings of the Engineering Mechanics Institute (EMI) Conference*.

3. **Ding, F.**, Kareem, A. & Spence, S. M. J. (2017). *CFD-based multi-objective aerodynamic shape optimization of twisted tall buildings*, Gainesville, Florida, *Proceedings of the 13th Americas Conference on Wind Engineering (ACWE).*

Posters

1. **Ding, F.** & Kareem, A. (2019). Inflow and model-form uncertainty quantification in CFD using surrogate models. *John Hopkins University*, USACM Conference on Uncertainty Quantification in Computational Solid; Structural Materials Modeling.
2. **Ding, F.** & Kareem, A. (2017). An intelligent design of real-time morphing structures under winds. *Washington, DC*, 3rd Global Grand Challenges Summit (GGCS) organized by US National Academy of Engineering (NAE), the UK Royal Academy of Engineering (RAE); the Chinese Academy of Engineering (CAE).

Professional Services

- **Journal referee**: Building and Environment
- **Professional societies**: American Society of Civil Engineers (ASCE); Society for Industrial and Applied Mathematics (SIAM)

Certifications and Computer Proficiencies

Certificate	**Certificate of Deep Learning Specialization**, by Coursera.
Coding	C, C++, Python, Matlab, CUDA, LaTeX.
Software	OpenFOAM, Fluent, SAP2000, Etabs.