Curriculum Vitae

Pedro L. Fernández-Cabán, Ph.D.

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General Information

University address: Department of Civil and Environmental Engineering
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Professional Preparation

2017	Ph.D., University of Florida, Gainesville, FL. Major: Civil Engineering. Structures. Supervisor: Dr. Forrest J. Masters.
2017	M.E., University of Florida, Gainesville, FL. Major: Civil Engineering. Structures.
2013	B.S., University of Puerto Rico at Mayagüez. Major: Civil Engineering.

Professional Experience

2022–present	Assistant Professor, Civil Engineering, Florida A&M University–Florida State University.
2019–2022	Assistant Professor, Civil Engineering, Clarkson University.
2017–2019	Postdoctoral Research Associate, Civil Engineering, University of Maryland.

Honors, Awards, and Prizes

Tau Beta Pi Faculty Award, Clarkson University (2022).
Graduate Outstanding Student Award, Engineering School of Sustainable Infrastructure and Environment (ESSIE); University of Florida (2017).
International Code Council (ICC) Scholarship, Federal Alliance for Safe Homes (FLASH) (2016).

Fellowship(s)

Enabling the Next Generation of Hazards and Disasters Researchers Fellowship; National Science Foundation (2020–2022).
Bridge to the Doctorate Fellow; National Science Foundation (2013–2015).

Current Membership in Professional Organizations

Accreditation Board of Engineering and Technology (ABET) Student Advisory Committee
American Association for Wind Engineering (AAWE)
American Society of Civil Engineers (ASCE); Associate Member
Society of Hispanic Professional Engineers (SHPE)
Tau Beta Pi National Engineering Honor Society, Mayagüez Chapter

Teaching

Courses Taught

Analysis and Measurement Techniques for Wind (CGN 5930)
Computational Methods for Structural Analysis (Clarkson University) (CE420/520)
Steel Design (Clarkson University) (CE442)
Reinforced Concrete Design (Clarkson University) (CE441)
Mechanics of Engineering Structures (University of Florida)

Doctoral Committee Chair

Bakhshizadeh, A., doctoral student.
Khan, S. R., doctoral student.

Doctoral Committee Cochair

Mahmood, Z. N., doctoral student.

Doctoral Committee Member

Amankwah, S., doctoral student.
Farzaneh, F., doctoral candidate.
Jie Dong, doctoral candidate. *Aeroelastic Real-time Hybrid Simulation (AeroRTHS): Validation and Mitigation of Vortex-Induced Vibration of a Tall Building Structure*. [Clarkson University]
Lissette Fernández, doctoral candidate. *Computationally Efficient Analysis, Optimization and Holistic Design of Vibrational Energy Harvesters at the Infrastructure Scale*. [Clarkson University]

Master's Committee Chair

Mokhtar, N., graduate. (2024).

Master's Committee Member

Grand, M., graduate. (2024).
Purkayastha, S., graduate. (2024).

Supervision of Student Research Not Related to Thesis or Dissertation

Mejia, O. (May–Aug 2023).

Nikolic, N. (May–Aug 2023).

Hummer, J. (Jan–May 2022).

Benitez, B. (Aug–Dec 2021).

Tyler, D. (Aug–Dec 2021).

Turay, B. M. (May–Aug 2021).

Thomson, K. J. (Jan–Aug 2020).

Research and Original Creative Work

Publications

Refereed Journal Articles

Mahmood, Z. N., Fernández-Cabán, P. L., & Jung, S. (2024). Artificial Neural Networks for Predicting Mean Wind Profiles Over Heterogeneous Terrains. *Journal of Wind Engineering and Industrial Aerodynamics* (Under Review).

Mokhtar, N. O., Fernández-Cabán, P. L., & Catarelli, R. A. (2024). Investigating low-frequency turbulence effects on building roof pressures through active flow modulation in a large boundary layer wind tunnel. *Journal of Wind Engineering and Industrial Aerodynamics* (Under Review).

Ojeda-Tuz, M., Chauhan, M., Fernández-Cabán, P.L., Catarelli, R.A, Shields, M., & Gurley, K. (2024). Modulating higher-order statistics of turbulent boundary layer wind fields using randomized grid roughness. *Journal of Wind Engineering and Industrial Aerodynamics* (Under Review).

Mokhtar, N. O., Fernández-Cabán, P. L., & Catarelli, R. A. (2024). Autonomous large-scale turbulence modulation of atmospheric boundary layer flows using a multi-fan flow control instrument. *Experiments in Fluids*, *65*(1), 5. Retrieved from https://doi.org/10.1007/s00348-023-03739-z doi:10.1007/s00348-023-03739-z

Nasrollah, A., Jung, S., Kakareko, G., & Fernández-Cabán, P. L. (2023). Wind-Tunnel Simulation of Nonuniform Terrains Using Local Roughness Zones. *Boundary-Layer Meteorology*, *188*, 463-484. Retrieved from https://doi.org/10.1007/s10546-023-00822-0 doi:10.1007/s10546-023-00822-0

Phillips, B. M., Masters, F. J., Raubenheimer, B., Olabarrieta, M., Morrison, E. S., Fernández-Cabán, P. L., Ferraro, C. C., Davis, J. R., Rawlinson, T. A., & Rodgers, M. B. (2023). An Experimental Platform to Study Wind, Hydrodynamic, and Biochemical Conditions in the Littoral Zone During Extreme Coastal Storms. *Oceanography*, 2. Retrieved from https://doi.org/10.5670/oceanog.2023.s1.19

Turay, B. M., Fernández-Cabán, P. L., & Thomson, K. J. (2022). Effect of member grouping and pool size of discrete cross-sections on the optimal design of a large-scale 3D steel frame. *Engineering Structures*, *258*, 114098. Retrieved from https://doi.org/10.1016%2Fj.engstruct.2022.114098 doi:10.1016/j.engstruct.2022.114098

Whiteman, M. L., Fernández-Cabán, P. L., Phillips, B. M., Masters, F. J., Davis, J. R., & Bridge, J. A. (2022). Cyber-physical aerodynamic shape optimization of a tall building in a wind tunnel using an active fin system. *Journal of Wind Engineering and Industrial*

Aerodynamics, 220, 104835. Retrieved from https://doi.org/10.1016%2Fj.jweia.2021.104835 doi:10.1016/j.jweia.2021.104835

Fernández-Cabán, P. L., & Masters, F. J. (2020). Experiments in a Large Boundary Layer Wind Tunnel: Upstream Terrain Effects on Surface Pressures Acting on a Low-Rise Structure. *Journal of Structural Engineering*. Retrieved from https://doi.org/10.1061/(ASCE)ST.1943-541X.0002690 doi:10.1061/(ASCE)ST.1943-541X.0002690

Fernández-Cabán, P. L., Whiteman, M. L., Phillips, B. M., Masters, F. J., Davis, J. R., & Bridge, J. A. (2020). Cyber-physical design and optimization of tall building dynamics using aeroelastic wind tunnel modeling. *Journal of Wind Engineering and Industrial Aerodynamics, 198*.

Tian, J., Gurley, K. R., Diaz, M. T., Fernández-Cabán, P. L., Masters, F. J., & Fang, R. (2020). Low-rise gable roof buildings pressure prediction using deep neural networks. *Journal of Wind Engineering and Industrial Aerodynamics, 196*.

Fernández-Cabán, P. L., Alford, A. A., Bell, M. J., Biggerstaff, M. I., Carrie, G. D., Hirth, B., Kosiba, K., Phillips, B. M., Schroeder, J. L., Waugh, S. M., Williford, E., Wurman, J., & Masters, F. J. (2019). Observing Hurricane Harvey's Eyewall at Landfall. *Bulletin of the American Meteorological Society*. Retrieved from http://dx.doi.org/10.1175/bams-d-17-0237.1 doi:10.1175/bams-d-17-0237.1

Zhang, R., Phillips, B. M., Fernández-Cabán, P. L., & Masters, F. J. (2019). Cyber-physical structural optimization using real-time hybrid simulation. *Engineering Structures, 195*, 113-124.

Fernández-Cabán, P. L., & Masters, F. J. (2018). Effects of freestream turbulence on the pressure acting on a low-rise building roof in the separated flow region. *Frontiers in Built Environment, 4*.

Fernández-Cabán, P. L., & Masters, F. J. (2018). Hybridizing particle swarm and big bang-big crunch optimization methods to explore then exploit the design domain of large planar frame structures. *Computers and Structures, 202*, 1-14.

Whiteman, M. L., Fernández-Cabán, P. L., Phillips, B. M., Masters, F. J., Bridge, J. A., & Davis, J. R. (2018). Multi-objective optimal design of a building envelope and structural system using cyber-physical modeling in a wind tunnel. *Frontiers in Built Environment, 4*.

Whiteman, M. L., Fernández Cabán, P. L., Phillips, B. M., Masters, F. J., Bridge, J. A., & Davis, J. R. (2018). Optimal Design in Wind Engineering Using Cyber-Physical Systems and Non-Stochastic Search Algorithms. *Structures Congress 2018: Blast, Impact Loading, and Response; and Research and Education - Selected Papers from the Structures Congress 2018, 2018-April*, 64-76.

Whiteman, M. L., Phillips, B. M., Fernández-Cabán, P. L., Masters, F. J., Bridge, J. A., & Davis, J. R. (2018). Optimal design of structures using cyber-physical wind tunnel experiments with mechatronic models. *Journal of Wind Engineering and Industrial Aerodynamics*, *172*, 441-452.

Fernández-Cabán, P. L., Masters, F. J., & Phillips, B. M. (2018). Predicting roof pressures on a low-rise structure from freestream turbulence using artificial neural networks. *Frontiers in Built Environment*, *4*.

Fernández-Cabán, P. L., & Masters, F. J. (2017). Near surface wind longitudinal velocity positively skews with increasing aerodynamic roughness length. *Journal of Wind Engineering and Industrial Aerodynamics*, *169*, 94-105.

Refereed Proceedings

Khan, S. R., Fernández-Cabán, P. L., Tao, C., & Guan, S. (2023). Hurricane-Induced Surge and Inland Flooding Effects on Localized Near-Surface Wind Flows in Suburban Coastal Communities. In *ASCE Inspire 2023*. American Society of Civil Engineering (ASCE), Reston, VA. Retrieved from https://doi.org/10.1061/9780784485163.0

Whiteman, M., Fernández-Cabán, P. L., Phillips, B. M., Masters, F. J., Bridge, J. R., & Davis, J. R. (2018). Optimal Design in Wind Engineering Using Cyber-Physical Systems and Non-Stochastic Search Algorithms. In *Structures Congress*. American Society of Civil Engineering (ASCE), Reston, VA.

Published Datasets

Mokhtar, N. O., Fernandez Caban, P. L., & Catarelli, R. A. (2023). *Generation of large-scale gust structures in a large boundary layer wind tunnel: 3D flow measurement experiments*. Designsafe-CI. Retrieved from https://doi.org/10.17603/ds2-0m8r-my92

Whiteman, M., P. Fernández-Cabán, B. Phillips, F. Masters, J. Davis, J. Bridge, S. Powell (2019). "Cyber-physical Optimization of Parapet Wall Height for a Low-rise Building Model", in Cyber-Physical Systems Approach for the Optimal Design in Wind Engineering: Parapet Walls. DesignSafe-CI. https://doi.org/10.17603/ds2-qrt3-8730

Whiteman, M., Fernández-Cabán, P., L., B. Phillips, F. Masters, J. Davis, J. Rice, S. Powell (2019). "Boundary Layer Wind Tunnel Tests of a Low-rise Building Model with Varying Parapet Height", in Cyber-Physical Systems Approach for the Optimal Design in Wind Engineering: Parapet Walls. DesignSafe-CI. https://doi.org/10.17603/ds2-edh5-nd38

Fernández-Cabán, P., L., F. Masters (2018). "Upwind Terrain Effects on Low-Rise Building Pressure Loading Observed in the Boundary Layer Wind Tunnel", in 1055744 CAREER:

Behavior of Hurricane Wind and Wind-Driven Rain in the Coastal Suburban Roughness Sublayer. DesignSafe-CI. https://doi.org/10.17603/DS2W670

Presentations

Invited Keynote and Plenary Presentations at Symposia

Fernández-Cabán, P. L. (presented 2021, May). Enhancing the Wind Performance of Civil Infrastructure Through "Online" Cyber-Physical Wind Tunnel Simulation. Keynote presentation in Nigel Kaye (Chair), *6th American Association for Wind Engineering (AAWE) Workshop*. Symposium conducted at the meeting of Clemson University, Virtual. (National) Retrieved from https://cecas.clemson.edu/wind/6th-aawe-workshop/program/friday-may-14/keynote-iii-dr-pedro-fernandez-caban/

Invited Lightning Talk

Fernández-Cabán, P. L. (presented 2024, July). *Harnessing High-Throughput Physical Experimentation to Accelerate Discovery and Enhance Numerical Prediction Models*. Natural Hazards Engineering Research Infrastructure (NHERI) Summit, University of Maryland, College Park, Maryland (National).

Invited Presentations at Conferences

Fernández-Cabán, P. L. (presented 2016, November). *Metaheuristic optimization in engineering design"*. Presentation at SHPE National Conference, Society of Hispanic Professional Engineers (SHPE), Seattle, WA. (National)

Refereed Presentations at Conferences

Khan, S.R., & Fernández-Cabán, P. L. (presented 2024, July). *A self-adaptive evolutionary algorithm to enhance RANS wind pressure predictions in flow separated regions*. Presentation at 9th Colloquium on Bluff Body Aerodynamics and Applications (BBAA IX), University of Birmingham, Birmingham, UK. (International)

Mokhtar, N. O., & Fernández-Cabán, P. L. (presented 2024, June). *Integrating large- and small-scale atmospheric turbulence features into ML-based wind load prediction models*. Presentation at Engineering Mechanics Institute (EMI), American Society for Civil Engineering, Chicago, Illinois. (National)

Mokhtar, N. O., Fernández-Cabán, P. L., & Khan, S. R. (presented 2023, August). *Terrain-induced and large-scale turbulence effects on the performance of wind mitigation strategies for low-rise buildings*. Presentation at 16th International Conference

on Wind Engineering (ICWE16), International Association for Wind Engineering (IAWE), Florence, Italy. (International) 190200

Mokhtar, N. O., & Fernández-Cabán, P. L. (presented 2023, June). *A data-driven DNN model for wind load prediction based on inflow turbulence and minor architectural features of low-rise building roof systems*. Presentation at Engineering Mechanics Institute (EMI), American Society for Civil Engineering, Atlanta, Georgia. (National)

Kim, S., Alinejad, N., Jung, S., & Fernández-Cabán, P. L. (presented 2022, September). *Comparison of the effective roughness length between field measurements and wind tunnel testing*. Presentation at 8th European-African Conference on Wind Engineering, International Association for Wind Engineering (IAWE), Bucharest, Romania. (International)

Fernández-Cabán, P. L., & Catarelli, R. (presented 2022, June). *Large-Scale Turbulence Modulation in the Wind Tunnel using a Multi-Fan Flow Control Instrument*. Presentation at Engineering Mechanics Institute (EMI), American Society of Civil Engineers (ASCE), Baltimore, MD. (National)

Fernández-Cabán, P. L. (presented 2022, April). *Integrating HPC and Swarm Intelligence to Optimize Large-Scale Structures*. Presentation at Structures Congress, American Society of Civil Engineers (ASCE), Atlanta, GA. (National)

Fernández-Cabán, P. L., Masters, F. J., & Phillips, B. M. (presented 2019, September). *Predicting roof pressures on a low-rise building from the turbulence characteristics of the freestream*. Presentation at 15th International Conference on Wind Engineering (ICWE15), International Associations for Wind Engineering, Beijing, China. (International)

Fernández-Cabán, P. L. (presented 2019, June). *Optimal Design of Tall Buildings Using Cyber-Physical Aeroelastic Wind Tunnel Experiments*. Presentation at Engineering Mechanics Institute (EMI), American Society of Civil Engineers (ASCE), Pasadena, CA. (National)

Fernández-Cabán, P. L. (presented 2018, April). *Optimal design in wind engineering using cyber-physical systems and non-stochastic search algorithms*. Presentation at Structures Congress, American Society of Civil Engineers (ASCE), Dallas, TX. (National)

Fernández-Cabán, P. L. (presented 2017, May). *Influence controlled particle swarm for discrete optimization of wind-sensitive steel frames*. Presentation at 13th Americas Conference on Wind Engineering (ACWE13), American Association for Wind Engineering (AAWE), Gainesville, FL. (National)

Fernández-Cabán, P. L. (presented 2017, May). *Near surface wind longitudinal velocity positively skews with increasing aerodynamic roughness length*. Presentation at 13th

Americas Conference on Wind Engineering (ACWE13), American Association for Wind Engineering (AAWE), Gainesville, FL. (National)

Fernández-Cabán, P. L. (presented 2017, May). *The spatial pressure distribution on low-rise buildings varies with surface roughness*. Presentation at 13th Americas Conference on Wind Engineering (ACWE13), American Association for Wind Engineering (AAWE), Gainesville, FL. (National)

Fernández-Cabán, P. L. (presented 2016, January). *Anemometric observations in the roughness sublayer*. Presentation at Federal Alliance for Safe Homes (FLASH) Conference, Federal Alliance for Safe Homes, Orlando, FL. (National)

Fernández-Cabán, P. L. (presented 2015, June). *Metaheuristic optimization of wind-sensitive structures*. Presentation at 14th International Conference on Wind Engineering (ICWE14), International Associations for Wind Engineering, Porto Alegre, Brazil. (International)

Refereed Presentations at Symposia

Fernández-Cabán, P. L., Masters, F. J., & Phillips, B. M. (presented 2018, September). Predicting peak wind pressures on a low-rise structure from upstream terrain conditions. In Dr. Frank Lombardo (Chair), *Tornado Hazard Wind Assessment and ReducTion Symposium*. Presentation at the meeting of University of Illinois - Urbana-Champaign, Champaign, IL. (National)

Invited Workshops

Fernández-Cabán, P. L. (2016, August). *NHERI Experimental Facility: University of Florida*. Workshop delivered at 4th American Association for Wind Engineering (AAWE) Workshop, Miami, FL. (National)

Refereed Workshops

Fernández-Cabán, P. L. (2019, March). *Developing cyber-physical tools to optimize the performance of civil infrastructure under wind hazards*. Workshop delivered at ETH-MECHS Workshop, Zurich, Switzerland. (International)

Fernández-Cabán, P. L., & Masters, F. J. (2016, August). *Implications of observed non-Gaussian trends in the roughness sublayer on suburban exposure coefficient profiles*. Workshop delivered at 4th American Association for Wind Engineering (AAWE) Workshop, Miami, FL. (National)

Invited Lectures and Readings of Original Work

Fernández-Cabán, P. L. (2022, December). *Leveraging machine learning, automation, and advanced field monitoring techniques to enhance hurricane resilience*. Delivered at Emerald Coast Area Winter Resilience Collaborative Meeting, Virtual. (Regional)

Fernández-Cabán, P. L. (2018, May). *Developing cyber-physical tools for performance evaluation and optimization of civil infrastructure under extreme winds*. Delivered at National Institute of Standards and Technology (NIST). (State)

Patented Inventions

Masters, F. J., Fernández-Cabán, P. L., Phillips, B. M., Ferraro, C. C., Raubenheimer, B., Lu, T. W., & Esposito, J. A. (2021). *In Situ Measurement Station for Monitoring Wind and Water Properties in Extreme Hydrodynamic Conditions*. US20220155486A1, University of Florida. Gainesville, FL. Retrieved from https://patentimages.storage.googleapis.com/aa/9e/72/1b764231cce6e4/US20220155486A1.pdf

Contracts and Grants

Contracts and Grants Funded

Fernández-Cabán, P. L. (Feb 2024–Jan 2029). *CAREER: Fusing Meta-Learning Systems and Field Observations*. Funded by National Science Foundation (NSF). (2339437). Total award $548,702.

Fernández-Cabán, P. L., & Jung, S. (Jan 2024–Jan 2026). *Harnessing Physics-Based Knowledge and Deep Learning to Enhance Civil Infrastructure Performance in Extreme Winds*. Funded by FSU. Total award $66,450.

Fernández-Cabán, P. L. (May 2023–Aug 2023). *FYAP: Fusing Multi-Fidelity Modeling and Deep Learning to Enhance Wind Load Prediction Tools for Building Structures*. Funded by FSU. Total award $20,000.

Fernández-Cabán, P. L. (Jan 2022–Dec 2023). *ERI: Physical Simulation of Terrain-Induced and Large-Scale Turbulence Effects on the Effectiveness of Wind Mitigation Strategies for Low-Rise Buildings*. Funded by National Science Foundation (NSF). (2138414). Total award $199,159.

Service

Florida State University

FSU Department Service

Member, Program Manager Search Committee (2023).

Member, CEE Graduate Committee (2022–2023).

Faculty Advisor, Society of Hispanic Professional Engineer (SHPE) (2024–present)

The Profession

Guest Reviewer for Refereed Journals

Experimental Techniques (Jan 2022–present).

MDPI Applied Sciences (Jan 2022–present).

Wind and Structures (Jan 2022–present).

Engineering Structures (Aug 2021–present).

Natural Hazards Review (Aug 2021–present).

Journal of Structural Engineering (Jan 2020–present).

Journal of Wind Engineering and Industrial Aerodynamics (Jan 2020–present).

Frontiers in Built Environment (Aug 2019–present).

Journal of Architectural Engineering (Aug 2019–present).

Journal of Engineering Mechanics (Aug 2019–present).

Engineering Structures (Oct–Nov 2023).

Journal of Machine Learning for Modeling and Computing (May–Jul 2023).

Experimental Techniques (Apr–May 2023).

Journal of Structural Engineering (Mar–Apr 2023).

MDPI Buildings (Mar–Apr 2023).

Chair of a Symposium

Fernández-Cabán, P. L., Jung, S., & Wang, H. (Chair). (2024, June). *Machine Learning Applications in Wind Engineering*. Symposium conducted at the meeting of ASCE Engineering Mechanics Institute (EMI), Chicago, IL.

Fernández-Cabán, P. L., & Jung, S. (Chair). (2023, June). *Machine Learning Applications in Wind Engineering*. Symposium conducted at the meeting of ASCE Engineering Mechanics Institute (EMI), Atlanta, GA.

Service to Professional Associations

Vice-Chair, Advances in Information Technology (AIT) Subcommittee, American Society of Civil Engineers (ASCE) (2022–present).

Interviews

Zehner, D. R. (2023, May). Episode 2: Wind tunnel research to protect low-rise buildings from hurricane winds. *NHERI DesignSafe Radio Podcast*. Retrieved from https://www.designsafe-ci.org/podcast/

Zehner, D. R. (2023, April). Episode 1: Designing roofs to resist hurricane winds. *NHERI DesignSafe Radio Podcast*. Retrieved from https://www.designsafe-ci.org/podcast/

Service to Other Universities

Faculty Advisor, ASCE/AISC Steel Bridge Team, *Clarkson University* (2019–2022).

Faculty Mentor, NSF REU Site: High-Performance Computing with Engineering Applications (NSF Award: OAC-1852102), *Clarkson University* (2021).