

Murray J. Morrison

PROFESSIONAL EXPERIENCE

2014-Present, Senior Research Engineer & Instrumentation Director, Insurance Institute for Business and Home Safety

2011-2014, Research Engineer, Insurance Institute for Business and Home Safety

2010-2011, Post-Doctoral Fellow, Insurance Institute for Business and Home Safety

2008-2010, Technical Coordinator, The University of Western Ontario

2006-2010, Research Assistant, The University of Western Ontario

Consulting

Tohoku University, Japan: Development of a wind loading system able to replicate realistic wind pressures for structural evaluation of on Japanese building systems. Advise, students on experimental design and assist with data analysis.

Cyclone Testing Station, James Cook University Townsville, Australia: Full-scale testing and wind tunnel testing including projects related to internal pressures, wind failure of pierced metal cladding, and response characteristics of Australian wind anemometers

PROFESSIONAL ACTIVITY AND ASSOCIATIONS

Board Member AAWE 2015-2018

Chair of the ASCE Structural Wind Engineering Subcommittee on Partial Turbulence Simulation

Chair of the ASCE Environmental Wind Engineering Committee, 2016-Present

Member of the ASCE Environmental Wind Engineering Committee, 2014-2016

Reviewer, *Frontiers in Built Environment*, 2015

Reviewer, *Journal of Wind Engineering and Industrial Aerodynamics*, 2013-Present

Reviewer, *Journal of Structural Engineering*, 2013-Present

Reviewer, *Natural Hazards Review*, 2012

Reviewer, *Wind and Structures, An International Journal*, 2016

PROFESSIONAL ASSOCIATION

The American Association for Wind Engineering (AAWE)

American Society of Civil Engineers (ASCE)

American Society of Mechanical Engineers (ASME)

Architectural Institute of Japan (AIJ)

EDUCATION

2010 Ph.D., Civil and Environmental Engineering

The University of Western Ontario

Response of a Two-Story Residential House Under Realistic Fluctuating Wind Loads

2006 M.E.Sc., Mechanical and Materials Engineering

The University of Western Ontario

Vortex Shedding from Small Apex Angle Pyramids

2004 B.E.Sc., Mechanical and Materials Engineering with Distinction

The University of Western Ontario

RESEARCH INTERESTS AND AREAS OF EXPERTISE

Structural Response; Wind Damage; Dispersion Modeling; Bluff Body Aerodynamics; Turbulence; Reynolds Number and Turbulence Scale Effects on surface pressure; Adaptive Control Systems;

Instrumentation and Data Acquisition Hardware; Signal Processing; Model Scale and Full Scale testing;

HONOURS/AWARDS

2013 AAWE Richard Marshall Award. *Best Doctoral thesis related to experimental methods or field investigations in the 'Americas Region'.*

2007-2010 NSERC PGS-D3, \$63,000 (CAD) *National competition for Doctoral students.*

2006-2007 OGSST Doctoral Scholarship, \$15,000 (CAD) *Institutional Competitive Scholarship.*

2006 Outstanding Teaching Assistant *The University of Western Ontario*

2005-2006 NSERC PGS-M, \$17,300 (CAD) *National competition for Masters students*

2004-2005 OGS Masters Scholarship, \$15,000 (CAD) *Provincial competitive for Masters students.*

2003 NSERC USRA, \$4,500 (CAD) *Institutional competitive for undergraduate students*

PUBLICATIONS

Refereed Journal Articles

- Standohar-Alfano C.D., Estes H., Johnston T., **Morrison M.J.**, Brown-Giammanco T.M., (under review). “Reducing losses from wind-related natural perils: Research at the IBHS Research Center” *Frontiers in built environment.*
- Miller C., Kopp G.A., **Morrison M.J.**, Kemp G., Drought N., Myszko M., (under review). “A multi-chamber, pressure-based test method to determine wind loads on air-permeable, multi-layer cladding systems” *Frontiers in built environment.*
- Kopp G.A., **Morrison M.J.**, (under review). “Component and Cladding Wind Loads for Low-Slope Roofs on Low-Rise Buildings” *Journal of Structural Engineering.*
- Gavanski E., Takahashi M., Uematsu Y., **Morrison M.J.**, (2015). “Quantitative performance evaluation of time-varying wind pressure loading actuator.” *AIJ Journal of Technology and Design*, 21(49), 1075-1080. (In Japanese).
- Morrison M.J.**, Kopp G.A., Gavanski E., Miller C., Ashton A., (2014). “Assessment of damage to residential construction from the tornadoes in Vaughan, Ontario, on 20 August 2009.” *Canadian Journal of Civil Engineering*, 41(6), 550-558.
- Henderson D.J., **Morrison M.J.**, Kopp G.A., (2013) “Response of toe-nailed, roof-to-wall connection to extreme wind loads in a full-scale, timber-framed, hip roof.” *Engineering Structures*, 56, 1474-1483.
- Miller C., Holmes J., Henderson D., Ginger J., **Morrison M.**, (2013). “The Response of the Dines Anemometer to Gusts and Comparisons with Cup Anemometers.” *Journal of Atmospheric and Oceanic Technology*, 30(7), 1320-1336.
- Kopp G.A., **Morrison M.J.**, Henderson D.J., (2012). “Full-scale testing of low-rise, residential buildings with realistic wind loads.” *Journal of Wind Engineering and Industrial Aerodynamics*, 104-106, 25-39.
- Kopp G.A., Farquhar S., **Morrison M.J.**, (2012). “Aerodynamic mechanisms for wind loads on tilted, roof-mounted, solar arrays.” *Journal of Wind Engineering and Industrial Aerodynamics*, 111, 40-52.
- Morrison M.J.**, Henderson D.J., Kopp G.A., (2012). “The response of a wood-frame, gable roof to fluctuating wind loads.” *Engineering Structures*, 41, 498-509.
- Morrison M.J.**, Kopp G.A. (2011). “Performance of toe-nail connections under realistic wind loading.” *Engineering Structures*, 33(1), 69-76.
- Kopp G.A., **Morrison M.J.**, Kordi B., Miller C. (2011). “A Method to Assess Peak Storm Wind Speeds Using Detailed Damage Surveys.” *Engineering Structures*, 33(1), 90-98.
- Kopp G.A., **Morrison M.J.** (2011) “Discussion of “Tornado-Induced Wind Loads on a Low-Rise Building.” by F.L. Haan Jr.; V.K. Balaramudu; and P.P. Sarkar”, *Journal of Structural Engineering*, 137, 1620-1622.

- Morrison M.J.**, Kopp G. A. (2010). "Analysis of Wind-Induced Clip Loads on Standing Seam Metal Roofs." *Journal of Structural Engineering*, 136(3), 334-337.
- Kopp G.A., **Morrison M.J.**, Gavanski E., Henderson D., Hong H. (2010). "The 'Three Little Pigs Project: Hurricane Risk Mitigation by Integrated Wind Tunnel and Full-Scale Laboratory Tests.'" *Natural Hazards Review*, 11(4), 151-161.
- Henderson D., Ginger J., **Morrison M.J.**, Kopp G.A. (2009). "Simulated tropical cyclonic winds for low cycle fatigue loading of steel roofing." *Journal of Wind and Structures*, 12(4), 383-400.

Conference Proceedings

- Miller C., Kopp, G., **Morrison M.** "Pressure Equalization in Residential Wall Cladding Systems." *14th International Conference on Wind Engineering*, Porto Alegre, Brazil, 2015.
- Morrison M.J.**, Reinhold T.A. "Performance of Metal Roofing to Realistic Wind Loads and Evaluation of Current Test Standards." *14th International Conference on Wind Engineering*, Porto Alegre, Brazil, 2015.
- Morrison M.J.**, Cope A.D. "Wind Performance and Evaluation Methods of Multi-Layered Wall Assemblies." *Structures Congress*, 2735-2748, Portland, OR, 2015.
- Kopp G.A., Oh J.H., **Morrison M.J.** "Building components and cladding: Recent developments and future possibilities for assessing wind effects." *Wind Engineering Society 11th Biennial Conference*, Birmingham, UK, 2014.
- Guerts C.P.W., Kopp G.A., **Morrison M.J.** "A review of the wind loading zones for flat roofs in code provisions." *6th European and African Conference on Wind Engineering*, Cambridge, UK, 2013.
- Morrison M.J.** Miccolis C., Reinhold T.A., "Wind Loads on Small Roof Mounted Air-Conditioning Units" *12th Americas Conference on Wind Engineering*, Seattle, WA, USA, 2013.
- Morrison M.J.**, Kopp G.A., Gavanski E., Miller C., Ashton A., "Damage to residential construction from the tornadoes in Vaughan, Ontario on August 20, 2009." *6th Congress on Forensic Engineering*, San Francisco, CA, USA, 2012.
- Morrison M.J.**, Brown T.M., Liu Z., "Comparison of Field and Full-Scale Laboratory Peak Pressures at the IBHS Research Center." *Advances in Hurricane Engineering Conference*, Miami, FL, USA, 2012.
- Kopp G.A., Khan A., Henderson D.J., **Morrison M.J.**, "Analysis of wood-framed, roof failures under realistic hurricane wind loads." *Advances in Hurricane Engineering Conference*, Miami, FL, USA, 2012.
- Khan M.A.A., Henderson D.J., **Morrison M.J.**, Kopp G.A., "Damage accumulation and load sharing in residential, wood-frame roofs under fluctuating wind loads." *2012 Joint Conference of the Engineering Mechanics Institute and the 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*, Notre Dame, IN, USA, 2012
- Morrison M.J.**, Henderson D.J., Kopp, G.A., "Response of a Wood-Frame Gable Roof, Under Realistic Fluctuating Wind Loads." *13th International Conference on Wind Engineering*, Amsterdam, Netherlands, 2011.
- Henderson D.J., **Morrison M.J.**, Kopp G.A., "Spatially and temporally varying wind loads applied to a full-scale, timber-framed, hip roof." *13th International Conference on Wind Engineering*, Amsterdam, Netherlands, 2011.
- Brown T.M., Liu Z., **Morrison M.J.**, Cope A.D., Smith D.A., "Comparison of Field and Full-Scale Laboratory Pressure Data at the IBHS Research Center." *13th International Conference on Wind Engineering*, Amsterdam, Netherlands, 2011.
- Kopp G.A., **Morrison M.J.**, Henderson D.J., "Full-scale testing of low-rise buildings using realistically simulated wind loads." *13th International Conference on Wind Engineering*, Amsterdam, Netherlands, 2011.
- Miller C., Holmes J., Henderson D., Ginger J., **Morrison M.J.**, "The response of the Dines anemometer to turbulent gusting and comparisons with cup anemometers." *13th International Conference on Wind Engineering*, Amsterdam, Netherlands, 2011.

- Kopp G.A., **Morrison M.J.**, Sarathi P., Henderson D., Ginger J., “New Test Methods to Examine and Improve the Performance of Low Buildings in Extreme Winds.” *International Workshop on Wind Engineering Research and Practice: Current State-of-the-Art and Future Needs/Plans/Policies*, Charlotte, NC, May 2010.
- Morrison M.J.**, Kopp G.A., “Performance of Toe-nail connections under realistic wind loading.” *NASCC Structures Congress*, Orlando Florida, May 2010.
- Mapp, R., Masters F.J., Bolton S., Kopp G.A., **Morrison M.J.**, “Characterization of Wind-Driven Rain Ingress Through Residential Soffit Systems.” *ICBEST Vancouver Canada*, June, 2010.
- Henderson D.J., **Morrison M.J.**, Kopp G.A., “The spatially distributed, fluctuating loading of a full scale hip roof at 3LP.” *The 2nd AWE Workshop*, Marco Island Florida, 2010.
- Henderson D.J, **Morrison M.J.**, Ginger J.D., Miller C.A., “Response of Dines Anemometer to simulated winds.” *Southern Hemisphere Extreme Winds Workshop*, Canberra, Australia, 2010.
- Morrison M.J.**, Kopp G.A., “Application of realistic wind loads to the roof of a full-scale, wood-frame house.” *Proceedings of the 11th Americas Conference on Wind Engineering*, San Juan, Puerto Rico, 2009.
- Kopp G.A., **Morrison M.J.**, Kordi B., Miller C.A., “ A method to assess peak storm wind speeds using detailed damage surveys.” *Proceedings of the 5th ASCE Symposium on Forensic Engineering Conference*, Washington, USA, 2009.
- Kopp G.A, **Morrison M.J.**, Iizumi, E., “The 'Three Little Pigs' project: Integration of wind tunnel model scale tests and full-scale laboratory tests.” *ISWE3*, Tokyo Japan, 2008.
- Bartlett F.M., Galsworthy J.K., Henderson D., Hong H.P., Iizumi E., Incullet D.R., Kopp G.A., **Morrison M.J.**, Savory E., Sabarinathan J., Sauer A., Scott J., St Pierre L.M., Surry D., “The Three Little Pigs Project: A new test facility for full-scale small buildings.” *12th International Conference on Wind Engineering*, Cairns, Australia, 2007.
- Morrison M. J.**, Martinuzzi R. J., Savory E., Kopp G. A., “Vortex shedding from slender surface mounted pyramids.” *The CSME Forum*, Kananaskis, Alberta, 2006.

Non-Refereed Technical Reports and Articles

- Morrison, M.J.**, “IBHS Photovoltaic High Wind Research.” *Interface The Journal of RCI*, 33(3), 9-10.
- Kopp, G.A., **Morrison, M.J.**, “All About the Nails.” *Canadian Underwriter*, January 2009.
- Kopp, G.A., **Morrison, M.J.**, “Analysis of Peak Pressure Distributions and Design Loads on Solar Array.” Report: BLWT-SS29-2008, May 2008.
- Morrison, M.J.**, Kopp, G.A., “Evaluation of the ASCE 7-05 Definition of Edge and Corner Zones for Low-Rise Buildings.” Report: BLWT-1-2007, March 2007.
- Morrison M.J.**, Iizumi E., Miller C., Kopp G.A., “Vaughan Ontario Damage Investigation – The August 20, 2009 Tornadoes.” *Report for Environment Canada*, September 2009.
- Morrison M.J.**, Kordi B., Kopp G.A., “Damage Observations from the Events of April 25, 2008 in Southern Ontario.” *Report for Environment Canada*, May 2009.

Invited Presentations

- Morrison M.J.**, “Photovoltaic Array Response to Wind Loading.” Single Ply Roofing Industry Quarterly Meeting, April 2016.
- Morrison M.J.**, “ASCE 7-16 Changes to Low-Rise Building C&C Loads.” Metal Construction Association, February 2016.
- Morrison M.J.**, “ASCE 7-16 Changes to Low-Rise Building C&C Loads.” Duro-Last Roofing Inc., September 2015.
- Morrison M.J.**, “ASCE 7-16 Changes to Low-Rise Building C&C Loads.” Western States Roofing Contractors Association, June 2015.
- Morrison M.J.**, “ASCE 7-16 Changes to Low-Rise Building C&C Loads.” Single Ply Roofing Industry Quarterly Meeting, April 2015.

Morrison M.J., “Wind Loads on Low-rise Buildings and Full Scale Testing Methods.” Department of Architecture and Building Science, Graduate School of Engineering, Tohoku University, Sendai, Japan, February 2012.

Morrison M.J., “Full Scale Structural Testing.” Engineering Physical Sciences Seminar, James Cook University, Townsville Australia, May 2010.