

JOHN W. KURELEK

Assistant Professor, Mechanical and Materials Engineering
Queen's University

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ACADEMIC APPOINTMENTS

- 2024 – present Assistant Professor, Mechanical and Materials Engineering
Queen's University – *Kingston ON*
- 2024 – present Visiting Research Collaborator, Mechanical and Aerospace Engineering
Princeton University – *Princeton NJ*
- 2021 – 2023 Postdoctoral Research Fellow, Mechanical and Aerospace Engineering
Princeton University – *Princeton NJ*
Supervisor: Marcus Hultmark

EDUCATION

- 2016 – 2021 Doctor of Philosophy (dual degree), Mechanical Engineering
University of Waterloo – *Waterloo ON*
Thesis: [The Vortex Dynamics of Laminar Separation Bubbles](#)
Supervisor: Serhiy Yarusevych
- 2016 – 2021 Doctor of Philosophy (dual degree), Aerospace Engineering
Delft University of Technology – *Delft NL*
Supervisor: Marios Kotsonis
- 2014 – 2016 Master of Applied Science, Mechanical Engineering
University of Waterloo – *Waterloo ON*
Thesis: [Transition in a Laminar Separation Bubble and the Effect of Acoustic Excitation](#)
Supervisor: Serhiy Yarusevych
- 2007 – 2012 Bachelor of Applied Science, Mechanical Engineering
University of Waterloo – *Waterloo ON*
With Distinction and Dean's Honour List

AWARDED RESEARCH FUNDING (in CAD, Total \$377,500)

- | | | |
|-------------|---|-----------|
| 2024 – 2029 | <i>The Individual and Interactive Aerodynamics of Wind Turbines:
Experiments and Models for Next-Generation Wind Farms</i>
Natural Sciences and Engineering Research Council of Canada
Discovery Grant (100% share) | \$152,500 |
| 2024 – 2029 | <i>Wind Turbine Wake Interactions and Improved Wind Farm Performance</i>
Queen's University, Faculty of Engineering and Applied Science
Research Initiation Grant and Infrastructure Supplement (100% share) | \$200,000 |
| 2024 – 2029 | <i>Wind Tunnel Facility for Renewable Energy Education and Research</i>
Queen's University, Mechanical and Materials Engineering
Infrastructure Grant (100% share) | \$25,000 |

SUPERVISION**Training of Highly Qualified Personnel (HQP)**

- 2024 – present Aidan Westdal – MASc, Queen’s University
Yaw Effects on Wind Turbine Loading and Power Production
- 2024 – present Supun Pieris – Postdoc, Queen’s University
Aerodynamic Performance and Flow Physics of Rotor Sails at High Reynolds numbers
- 2024 Aidan Westdal – BASc, Queen’s University
Capstone Project: *Inhalation Screens for the Ontario Harm Reduction Distribution Program*

Advisor

- 2024 BASc students (x10), Queen’s University
Capstone Project: *Laboratory Wind Generator for Replication of Real-World Wind Conditions*
- 2024 Adnan El Makdah, Queen’s University
OTTER Lab Research Assistant
- 2019 – 2021 Connor Toppings – MASc, University of Waterloo
Laminar Separation Bubble Dynamics on a Finite Wing
- 2015 – 2017 Mark Istvan – MASc, University of Waterloo
Effects of Free-stream Turbulence Intensity on Laminar Separation Bubbles
- 2017 Marcus Lela – Intern, University of Waterloo
Wind Tunnel Test Section Design, Manufacturing and Construction
- 2017 Susanne Vanicat – Intern, University of Waterloo
Test Section Design for Re-circulating Low Turbulence Wind Tunnel

TEACHING

- 2024 – present Queen’s University, Mechanical and Materials Engineering
MECH 241: Fluid Mechanics I (*Head Instructor*)
MECH 460 & 462: Team Project (*Advisor to course projects*)
MECH 398: Mechanical and Materials Engineering Laboratory I (*Lab Advisor*)
- 2014 – 2020 University of Waterloo, Mechanical and Mechatronics Engineering
ME 562: Experimental Methods in Fluids (*Head Instructor x1 and Teaching Assistant x3*)
ME 362: Fluid Mechanics II (*Teaching Assistant*)
Teaching Assistantship Training (*Workshop Facilitator*)
Recipient of 4 teaching awards
- 2019 Fundamentals of University Teaching Certificate
University of Waterloo, Centre for Teaching Excellence

PROFESSIONAL ACTIVITIES

- 2024 – present Organizing Committee Member
1000 Islands Fluid Dynamics Conference
- 2025 Organizing Committee Member
6th International Conference on Experimental Fluid Mechanics (ICEFM)
- 2024 – present Reviewer
Experiments in Fluids, Experimental Thermal and Fluid Science
- 2015 – present Professional Memberships
American Physical Society, American Institute of Aeronautics and Astronautics

SERVICE

- 2024 – present Queen’s University, Department of Mechanical and Materials Engineering
Smith Engineering Transformation: MechMania 2.0 (*Committee Member*)
- 2024 – present PhD Dissertation Examiner
Theresa Salomone (2024), Frank Secretain (2024)

AWARDS

2021 – 2023	Postdoctoral Fellowship Natural Sciences and Engineering Research Council of Canada	\$90,000
2019 – 2020	Ontario Graduate Scholarship – Doctoral Government of Ontario	\$15,000
2019	Canada Graduate Scholarship – Michael Smith Foreign Study Supplement Natural Sciences and Engineering Research Council of Canada	\$6,000
2018 – 2019	Canada Graduate Scholarship – Doctoral (upgraded from PGS-D) Natural Sciences and Engineering Research Council of Canada	\$35,000
2016 – 2020	President’s Graduate Scholarship – Doctoral University of Waterloo	\$25,000
2016 – 2018	Postgraduate Graduate Scholarship – Doctoral Natural Sciences and Engineering Research Council of Canada	\$42,000
2016	Sanford Fleming Teaching Award University of Waterloo	
2016	Fluid Mechanics Award University of Waterloo	
2015 – 2016	Ontario Graduate Scholarship – Master’s Government of Ontario	\$15,000
2014 – 2016	President’s Graduate Scholarship – Master’s University of Waterloo	\$20,000
2014 – 2015	Canada Graduate Scholarship – Master’s Natural Sciences and Engineering Research Council of Canada	\$15,000
2014 – 2017	Teaching Assistant Excellence Award (<i>x3</i>) University of Waterloo	
2007	President’s Scholarship – Bachelor’s University of Waterloo	\$2,000

PUBLICATIONS**Journal Publications**

10. **Kurelek, J. W.**, Piqué, A., & Hultmark, M. (2023). Performance of the porous disk wind turbine model at a high Reynolds number: Solidity distribution and length scales effects. *Journal of Wind Engineering and Industrial Aerodynamics*, 237, 105377. <https://doi.org/10.1016/j.jweia.2023.105377>
9. **Kurelek, J. W.**, Kotsonis, M., & Yarusevych, S. (2023). Superposition of AC-DBD plasma actuator outputs for three-dimensional disturbance production in shear flows. *Experiments in Fluids*, 64(4), 84. <https://doi.org/10.1007/s00348-023-03616-9>

8. Shah, Y., **Kurelek, J. W.**, Peterson, S. D., & Yarusevych, S. (2021). Experimental investigation of indoor aerosol dispersion and accumulation in the context of COVID-19: Effects of masks and ventilation. *Physics of Fluids*, 33(7), 073315. <https://doi.org/10.1063/5.0057100>
7. Toppings, C. E., **Kurelek, J. W.**, & Yarusevych, S. (2021). Laminar Separation Bubble Development on a Finite Wing. *AIAA Journal*, 59(8), 2855–2867. <https://doi.org/10.2514/1.J060258>
6. **Kurelek, J. W.**, Tuna, B. A., Yarusevych, S., & Kotsonis, M. (2021). Three-Dimensional Development of Coherent Structures in a Two-Dimensional Laminar Separation Bubble. *AIAA Journal*, 59(2), 493–505. <https://doi.org/10.2514/1.J059700>
5. Tuna, B. A., **Kurelek, J. W.**, & Yarusevych, S. (2019). Surface-Pressure-Based Estimation of the Velocity Field in a Separation Bubble. *AIAA Journal*, 57(9), 3825–3837. <https://doi.org/10.2514/1.J058026>
4. **Kurelek, J. W.**, Yarusevych, S., & Kotsonis, M. (2019). Vortex merging in a laminar separation bubble under natural and forced conditions. *Physical Review Fluids*, 4(6), 063903. <https://doi.org/10.1103/PhysRevFluids.4.063903>
3. **Kurelek, J. W.**, Kotsonis, M., & Yarusevych, S. (2018). Transition in a separation bubble under tonal and broadband acoustic excitation. *Journal of Fluid Mechanics*, 853, 1–36. <https://doi.org/10.1017/jfm.2018.546>
2. Istvan, M. S., **Kurelek, J. W.**, & Yarusevych, S. (2018). Turbulence Intensity Effects on Laminar Separation Bubbles Formed over an Airfoil. *AIAA Journal*, 56(4), 1335–1347. <https://doi.org/10.2514/1.J056453>
1. **Kurelek, J. W.**, Lambert, A. R., & Yarusevych, S. (2016). Coherent Structures in the Transition Process of a Laminar Separation Bubble. *AIAA Journal*, 54(8), 2295–2309. <https://doi.org/10.2514/1.J054820>

Articles in Refereed Conference Proceedings

8. **Kurelek, J. W.**, Michelis, T., Kotsonis, M., & Yarusevych, S. (2024). LSB Flow Conditioning Using Spanwise Modulated Disturbances: HWA and Tomo-PIV Measurements. *13th International Symposium on Turbulence and Shear Flow Phenomena*. Montreal, CA, Jun 25--28.
7. **Kurelek, J. W.**, Yarusevych, S., & Kotsonis, M. (2019). The effect of three-dimensional forcing on flow development with a laminar separation bubble. *11th International Symposium on Turbulence and Shear Flow Phenomena*. Southampton, UK, July 30--Aug 2.
6. **Kurelek, J. W.**, Yarusevych, S., & Kotsonis, M. (2018). An Assessment of Flow Development in a Separation Bubble Subjected to Spanwise Modulated Disturbances using Particle Image Velocimetry. *48th AIAA Fluid Dynamics Conference*. Atlanta, GA, June 25--29. <https://doi.org/10.2514/6.2018-3733>
5. **Kurelek, J. W.**, Tuna, B. A., & Yarusevych, S. (2017). Three-Dimensional Vortex Development in a Laminar Separation Bubble formed over an Airfoil. *47th AIAA Fluid Dynamics Conference*. Denver, CO, June 5--9. <https://doi.org/10.2514/6.2017-3642>
4. **Kurelek, J. W.**, & Yarusevych, S. (2017). Merging of coherent structures in a separation bubble. *10th International Symposium on Turbulence and Shear Flow Phenomena*. Chicago, IL, July 6--9.
3. **Kurelek, J. W.**, & Yarusevych, S. (2016). The effect of acoustic excitation on the later stages of transition in a laminar separation bubble. *46th AIAA Fluid Dynamics Conference*. Washington, DC, July 13--17. <https://doi.org/10.2514/6.2016-3948>
2. Istvan, M. S., **Kurelek, J. W.**, & Yarusevych, S. (2016). The effect of free-stream turbulence on the structure of laminar separation bubbles. *46th AIAA Fluid Dynamics Conference*. Washington, DC, July 13--17. <https://doi.org/10.2514/6.2016-3946>
1. **Kurelek, J. W.**, Lambert, A., & Yarusevych, S. (2015). Development of coherent structures within the laminar separation bubble of a NACA0018 airfoil. *45th AIAA Fluid Dynamics Conference*. Dallas, TX, June 22-26. <https://doi.org/10.2514/6.2015-2627>

Conference Presentations and Posters (*supervised HQP underlined*)

23. **Kurelek, J. W.**, Piqué, A., Heck, K. S., Hultmark, M., & Howland, M. F. (2024). Horizontal Axis Wind Turbines under Yaw-Misalignment at High Reynolds Numbers: Experimental and Model Performance Predictions. *77th Annual Meeting of the APS Division of Fluid Dynamics*. Salt Lake City, UT, Nov 24–26.
22. Pieris, S., Rius-Vidales, A. F., Rijkens, A. A. K., **Kurelek, J. W.**, & Hultmark, M. (2024). Experimental investigation of aerodynamic loading on rotor sails at full dynamic similarity. *77th Annual Meeting of the APS Division of Fluid Dynamics*. Salt Lake City, UT, Nov 24–26.
21. Wei, N. J., Fleisher, A. Y., **Kurelek, J. W.**, & Hultmark, M. (2024). Traveling waves in the wakes of dynamically controlled wind turbines. *77th Annual Meeting of the APS Division of Fluid Dynamics*. Salt Lake City, UT, Nov 24–26.
20. Fleisher, A. Y., Wei, N. J., **Kurelek, J. W.**, & Hultmark, M. (2024). Wake Dynamics of a Wind Turbine with an Oscillating Rotation Rate at High Reynolds Numbers. *77th Annual Meeting of the APS Division of Fluid Dynamics*. Salt Lake City, UT, Nov 24–26.
19. Pieris, S., **Kurelek, J. W.**, & Hultmark, M. (2024). Setup design and experiments of rotor sails at high Reynolds numbers. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, May 10–12.
18. **Kurelek, J. W.**, Michelis, T., Kotsonis, M., & Yarusevych, S. (2024). Manipulating Vortex Development in a Laminar Separation Bubble using Spanwise Modulated Disturbances. *3rd Direct In-Person Colloquium on Vortex Dominated Flows (DisCoVor)*. Delft, NL, Apr 16–19.
17. **Kurelek, J. W.**, Piqué, A., Heck, K. S., Gayme, D. F., Howland, M. F., & Hultmark, M. (2023). Combined Experimental-Analytical Predictions of Thrust, Power and Wake Development of a Yaw-Misaligned Horizontal Axis Wind Turbine at High Reynolds numbers. *76th Annual Meeting of the APS Division of Fluid Dynamics*. Washington, DC, Nov 19–21.
16. Malarczyk, V. M., **Kurelek, J. W.**, & Hultmark, M. (2023). Characterizing Dynamic Stall at High Reynolds number using a Variable Pressure Wind Tunnel. *76th Annual Meeting of the APS Division of Fluid Dynamics*. Washington, DC, Nov 19–21.
15. **Kurelek, J. W.**, Piqué, A., Heck, K. S., Gayme, D. F., Howland, M. F., & Hultmark, M. (2023). A Combined Experimental-Analytical Study of a Yaw-Misaligned Wind Turbine: Thrust, Power and Wake Predictions. *North American Wind Energy Academy (NAWEA) / WindTech*. Denver, CO, Oct 30–Nov 3.
14. **Kurelek, J. W.**, Piqué, A., & Hultmark, M. (2023). Solidity and Length Scale Effects on Porous Disk Wind Turbine Wake Characteristics. *2nd Direct In-Person Colloquium on Vortex Dominated Flows (DisCoVor)*. Breckenridge, CO, May 16–19.
13. Malarczyk, V. M., **Kurelek, J. W.**, & Hultmark, M. (2023). Experimental Investigations into the Onset of Dynamic Stall. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 26–28.
12. **Kurelek, J. W.**, Piqué, A., & Hultmark, M. (2023). Improvements to the Porous Disk Wind Turbine Model: Solidity, Length Scale and Reynolds Number Effects. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 26–28.
11. **Kurelek, J. W.**, & Piqué, A. (2022). Improvements to the Actuator Disk Concept for Modelling Horizontal Axis Wind Turbines. *75th Annual Meeting of the APS Division of Fluid Dynamics*. Indianapolis, IN, Nov 20–22.
10. **Kurelek, J. W.**, Piqué, A., & Hultmark, M. (2021). A Comparison of Wind Turbine and Porous Disk Wakes at High Reynolds Numbers. *74th Annual Meeting of the APS Division of Fluid Dynamics*. Phoenix, AZ, Nov. 21–23.

9. **Kurelek, J. W.**, Kotsonis, M., & Yarusevych, S. (2019). Vortex Development in a Laminar Separation Bubble measured via Tomographic Particle Image Velocimetry. *72nd Annual Meeting of the APS Division of Fluid Dynamics*. Seattle, WA, Nov 23–26.
8. **Kurelek, J. W.**, Kotsonis, M., & Yarusevych, S. (2019). Three-Dimensional Disturbance Production using AC-DBD Plasma Actuation and the Effect on Transition in a Separation Bubble. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 26–28.
7. **Kurelek, J. W.**, Yarusevych, S., & Kotsonis, M. (2018). The effect of spanwise modulated DBD plasma forcing on flow development in a laminar separation bubble. *71st Annual Meeting of the APS Division of Fluid Dynamics*. Atlanta, GA, Nov 18–20.
6. **Kurelek, J. W.**, Yarusevych, S., & Kotsonis, M. (2017). The effects of tonal and broadband acoustic excitation on the transition process within a laminar separation bubble. *70th Annual Meeting of the APS Division of Fluid Dynamics*. Denver, CO, Nov 19–21.
5. **Kurelek, J. W.**, Tuna, B. A., & Yarusevych, S. (2017). A volumetric reconstruction of separation bubble flow over a NACA 0018 airfoil. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 21–23.
4. Tuna, B. A., **Kurelek, J. W.**, & Yarusevych, S. (2017). Sensor-based estimation of the velocity field in a separation bubble. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 21–23.
3. **Kurelek, J. W.**, & Yarusevych, S. (2016). Transition in a Laminar Separation Bubble and the Effect of Controlled Acoustic Disturbances. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, Apr 22–24.
2. **Kurelek, J. W.**, & Yarusevych, S. (2015). An investigation of natural and forced transition in a laminar separation bubble via time-resolved Particle Image Velocimetry. *68th Annual Meeting of the APS Division of Fluid Dynamics*. Boston, MA, Nov 22–24.
1. **Kurelek, J. W.**, Lambert, A. R., & Yarusevych, S. (2015). Investigation of Roll-Up Vortices within the Laminar Separation Bubble of a NACA 0018 Airfoil. *1000 Islands Fluid Dynamics Meeting*. Gananoque, ON, May 1–3.

Invited Talks

8. **Kurelek, J. W.** (2024). Wind Turbine Testing and Development in High Pressure Facilities. *Max Planck Institute for Dynamics and Self-Organization*. Göttingen, DE, Apr 23.
7. **Kurelek, J. W.** (2024). The Pressure is On: Wind Turbine Testing and Development at Extreme Pressures. *Delft University of Technology, Faculty of Aerospace Engineering*. Delft, NL, Apr 15.
6. **Kurelek, J. W.** (2023). Wind Turbine Modelling Improvements. *Queen's University, Department of Mechanical and Materials Engineering*. Kingston, ON, Jun 16.
5. **Kurelek, J. W.** (2023). Advancements in Wind Turbine Testing: Towards More Efficient and Quieter Wind Farms. *University of Calgary, Department of Mechanical and Manufacturing Engineering*. Calgary, AB, Apr 5.
4. **Kurelek, J. W.** (2023). Advancements in Wind Turbine Testing: Towards More Efficient and Quieter Wind Farms. *Syracuse University, Department of Mechanical and Aerospace Engineering*. Syracuse, NY, Dec 14.
3. **Kurelek, J. W.** (2022). Progress in Wind Turbine Experiments: Wake Modelling and Blade Aerodynamics. *University of Ottawa, Department of Mechanical Engineering*. Ottawa, ON, Oct 27.
2. **Kurelek, J. W.** (2022). Plasma Actuators: Toward Robust Devices for Applied Aerodynamic Control. *University of Michigan, Department of Mechanical Engineering*. Ann Arbor, MI, Apr 25.
1. **Kurelek, J. W.**, Kotsonis, M., & Yarusevych, S. (2020). Laminar Separation Bubble Bursting and Low Frequency Modulations: Prior Work and Recent Developments. *AIAA SciTech Forum and Exposition*. Orlando, FL, Jan 6–10.