

Paul Ziadé | BAsC, MEng, PhD, P.Eng

CONTACT INFORMATION

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Nationality: Canadian

MEB 224, 40 Research Place NW
Department of Mechanical Engineering and Manufacturing Engineering
Schulich School of Engineering
University of Calgary
Calgary, Alberta
T2N 1N4, Canada

RESEARCH AND PROFESSIONAL INTERESTS

Computational Fluid Dynamics, Large-Eddy Simulation, Machine Learning & Data Science Applied to Fluid Dynamics, Turbulence Modelling, Numerical Methods, Flow Control, Flow Instabilities and Transition, Aerodynamics and Aerodynamic Shape Optimization, High Performance Computing.

EDUCATION

University of Toronto, Toronto, Ontario, Canada

PhD, Mechanical Engineering, 2018

- Dissertation Topic: “High-Fidelity Numerical Modeling and Analysis of Low Reynolds Number Airfoils and Synthetic Jets”
- Advisor: Pierre Sullivan

University of Waterloo, Waterloo, Ontario, Canada

MEng, Mechanical Engineering, 2013

University of Waterloo, Waterloo, Ontario, Canada

BAsC, Mechanical Engineering, 2008

- *With Distinction*

HONOURS AND AWARDS

Engineering Students’ Society Professor of the Year Award, 2021

- Awarded for excellence in undergraduate teaching in the Energy Engineering program at the University of Calgary

Schulich School of Engineering Research Achievement Award, 2019

- Awarded for collaborative NSERC CRD: *Analysis, Design, Ground and Flight Testing of an Intake System for Transonic Flight*. Recipients: Dr. Craig Johansen (PI), Dr. Robert Martinuzzi, Dr. Christopher Morton, Dr. Artem Korobenko, Dr. Alex Ramirez-Serrano, Dr. Paul Ziadé.

Schulich School of Engineering Teaching Achievement Award, 2019

- Awarded for excellence in undergraduate teaching at the University of Calgary during the 2018/2019 academic year

Engineering Students’ Society First & Second Year Teaching Award, 2019

- Awarded for excellence in undergraduate teaching in the Mechanical Engineering program at the University of Calgary

Departmental Teaching Excellence Award, 2018

- Awarded to one faculty member for excellence in teaching in the Department of Mechanical and Manufacturing Engineering, University of Calgary

Outstanding Teacher Award, 2018

- Awarded to one faculty member for excellence in teaching in the Schulich School of Engineering, University of Calgary

Engineering Students' Society Third & Fourth Year Teaching Award, 2018

- Awarded for excellence in undergraduate teaching in the Energy Engineering program at the University of Calgary

Schulich School of Engineering Teaching Achievement Award, 2018

- Awarded for excellence in undergraduate teaching at the University of Calgary during the 2017/2018 academic year

Engineering Students' Society First & Second Year Teaching Award, 2018

- Awarded for excellence in undergraduate teaching in the Civil Engineering program at the University of Calgary

Engineering Students' Society Professor of the Year Award - Energy Engineering, 2018

- Awarded for excellence in undergraduate teaching in the Energy Engineering program at the University of Calgary

Engineering Students' Society Third & Fourth Year Teaching Award, 2017

- Awarded for excellence in undergraduate teaching in the Energy Engineering program at the University of Calgary

Schulich School of Engineering Teaching Achievement Award, 2017

- Awarded for excellence in undergraduate teaching at the University of Calgary during the 2016/2017 academic year

NSERC PGS-D, 2015-2018

- National award for top graduate researchers - \$63,000.

Glynn Williams Fellowship, 2014

- Awarded to the most promising doctoral candidate in the Department of Mechanical & Industrial Engineering - \$7,430.

Ontario Graduate Scholarship, 2014

- Provincial award for academic excellence and research potential - \$15,000.

Sir Sandford Fleming Teaching Award, 2009

- Award given annually to one graduate student in each engineering department to recognize outstanding undergraduate teaching.

PROFESSIONAL
EXPERIENCE

Applied FluidTech Ltd., Calgary, Alberta, Canada

Co-Founder & CEO

April, 2019 - Present

- Co-founder, engineer and CEO of high-tech engineering consultancy.
- Firm specializing in complex problems in thermo-fluids, with expertise in computational techniques, experiments, and data science.
- Current and past clients in the following industries: aeronautics & aerospace, oil & gas, wind & architectural, sports science, machine learning & data science, and biomedical.

University of Calgary - Department of Mechanical & Manufacturing Engineering, Calgary, Alberta, Canada

*Senior Instructor (tenured)
Instructor*

**July, 2021 - Present
Sep, 2016 - June 2021**

- Senior Instructor in the thermo-fluids group, teaching courses in fluid mechanics, aerodynamics, dynamics and engineering design.
- Conducting research in fundamental fluid mechanics, aerodynamics and engineering education.
- Led the creation of the new Aerospace Engineering Minor.
- Core and founding member of the University of Calgary Aerospace Network (UCAN).
- Formula SAE Faculty Advisor.

Associate Dean - Student Affairs & Student Professional Development **July, 2019 - June, 2020**

- Provided academic oversight to the Engineering Student Centre, Internship Program, Engineering Makerspace, competition teams, clubs and societies.
- Oversaw program placement, entrance scholarships, annual student reviews.
- Lead investigator for all academic misconduct allegations in the Faculty of Engineering.
- Chaired the Engineering Undergraduate Studies Committee.
- Revised guidelines and processes during the transition to online learning in the midst of the COVID-19 pandemic.
- Lead outreach activities in engineering, including Orientation Week, Open House, and High School Engineering Competition.

University of Toronto - Department of Mechanical & Industrial Engineering, Toronto, Ontario, Canada

Research Assistant

Jan, 2014 - August 2016

- Development and analysis of CFD methods for the analysis of low-Reynolds number airfoils. Application areas include micro-air vehicles, low-speed aircraft, and wind turbines.
- Developed a viscous and inviscid stability solver for the prediction of laminar-turbulence transition.
- Large-eddy Simulation (LES) of turbulent jets in cross-flow. Using numerical techniques and linear stability analysis to identify jet surface instabilities and evolution of counter-rotating vortex pair (CVP).
- Numerically investigating vortex structure and development of synthetic jet actuators (SJA) for aerodynamic flow control over low-Reynolds number airfoils.
- Attended the Scinet High Performance Computing Summer School (2014).

AMEC Nuclear Safety Solutions, Toronto, Ontario, Canada

Associate Analyst - Fuel Channel Integrity

May, 2012 - Dec, 2013

- Headed Fuel Channel Integrity Group's efforts to develop the capability of incorporating creep strain relaxation in the analysis of irradiated pressure tube flaws. Implemented user-programmable functions into Ansys with successful initial results.
- Part of a team developing probabilistic computational tools for fracture analysis using Monte Carlo methods.
- Performed outage planning and support for nuclear utilities. Advised on which fuel channels to inspect based on assessments of potential fuel channel degradation mechanisms, such as blister formation, hydride cracking, and creep deformation.
- Analyzed pressure tube flaws for fitness for service using deterministic tools.
- Single point of contact at AMEC Nuclear Safety Solutions for Bruce Power-related projects in the area of fitness for service.

Candu Energy (Atomic Energy of Canada Ltd.), Mississauga, Ontario, Canada

Major Structure Analyst - Component Integrity Section

Nov, 2010 - Apr, 2012

- Performed finite element (FE) analysis of nuclear fuel channels for the analysis of creep deformation and pressure-calandria tube contact.
- Worked on the early development of reactor core probabilistic analysis of fuel channel contact and blister formation using Monte Carlo methods.
- Created new FE models for special cases of fuel channel configurations.
- Performed analyses pertaining to the prediction of Calandria Tube (CT)/Liquid Injection Shut-down System (LISS) nozzle contact due to creep and sag deformation.

TEACHING
EXPERIENCE

University of Calgary, Calgary, Alberta, Canada

ENME 341 - Fundamentals of Fluid Mechanics

Jan-April, 2021

Second-year introductory fluid mechanics.

ENER 460 - Dynamics for Energy Engineering II

Jan-April, 2021

Course in rigid-body dynamics and introductory machine dynamics.

ENER 340 - Dynamics for Energy Engineering I

July-August, 2020

Introductory course in ordinary differential equations and rigid-body dynamics. (USRI: 6.25/7.0)

ENME 341 - Fundamentals of Fluid Mechanics

Jan-April, 2019

Second-year introductory fluid mechanics.

(USRI: 6.86/7.0)

ENME 519 - Aerodynamics

Sep-Dec, 2018

Fourth-year elective in analytical, computational and experimental aerodynamics. (USRI: 6.61/7.0)

ENER 340 - Dynamics for Energy Engineering I

July-August, 2018

Introductory course in ordinary differential equations and rigid-body dynamics. (USRI: 6.58/7.0)

ENER 460 - Dynamics for Energy Engineering II

Jan-April, 2018

Course in rigid-body dynamics and introductory machine dynamics.

(USRI: 6.73/7.0)

ENGG 349 - Dynamics

Sep-Dec, 2017

Introductory course in particle and rigid-body dynamics.

(USRI: 6.83/7.0)

ENER 340 - Dynamics for Energy Engineering I

July-August, 2017

Introductory course in ordinary differential equations and rigid-body dynamics. (USRI: 6.89/7.0)

ENER 460 - Dynamics for Energy Engineering II

Jan-April, 2017

Course in rigid-body dynamics and introductory machine dynamics.

(USRI: 6.78/7.0)

University of Toronto, Toronto, Ontario, Canada

MIE 563 - Engineering Analysis II

Jan, 2016 - April 2016

Teaching Assistant: Met with students on a weekly basis to assist with understanding of concepts related to derivation and solution of partial differential equations. Prepared detailed solution keys and graded weekly assignments.

APS 111/112 - Engineering Strategies & Practice

Sep, 2014 - Dec, 2015

Teaching Assistant: Led weekly tutorials for groups of 30-35 students. Assisted in development of group projects, proper engineering communication, and engineering design process. Graded assign-

ments related to project requirements, conceptual design specification, and final design specification.

MIE 418 - Fluid Mechanics II

Jan, 2014 - Apr, 2014

Teaching Assistant (Marking TA): Graded weekly fluid mechanics assignments. Held office hours to aid students in better understanding course material.

University of Waterloo, Waterloo, Ontario, Canada

SYDE 383 - Fluid Mechanics

Jan, 2010 - Apr, 2010

Teaching Assistant: Led weekly tutorials working through problem sets. Held office hours

MIE 351 - Fluid Mechanics I

Jan, 2009 - Apr, 2009

Teaching Assistant: Led weekly tutorials working through problem sets. Held office hours

ExpectATIONS Workshop

Instructor: Instructor and mentor for future teaching assistants in the Faculty of Engineering.

JOURNAL PAPERS

G. Doerksen, A. Korobenko, **P. Ziadé**, C. Johansen, *A Numerical Investigation of Recirculation in Axisymmetric Confined Jets*, Chemical Engineering Science (Submitted), 2021.

B. Dalman, A. Korobenko, **P. Ziadé**, A. Ramirez-Serrano, C. Johansen, *Design Limitations on Small-Scale Supersonic UAVs*, Acta Astronautica (Submitted), 2021.

K.H. Manohar, C. Morton, **P. Ziadé**, *Sparse Sensor-based Cylinder Flow Estimation Using Artificial Neural Networks*, Physical Review Fluids (Accepted), 2021.

H. Stoldt, C. Johansen, A. Korobenko, **P. Ziadé**, *Verification and Validation of High-Fidelity Open-Source Simulation Tools for Supersonic Aircraft Aerodynamic Analysis*, ASME Journal of Verification, Validation and Uncertainty Quantification, Vol. 6(4) (2021).

J. Wang, **P. Ziadé**, G. Huang, P. Sullivan, *Bi-global stability analysis in curvilinear coordinates*, Physics of Fluids, Vol. 31(10) (2019).

P. Ziadé, M. Feero, P. Sullivan, *A Numerical Study on the Influence of Cavity Shape on Synthetic Jet Performance*, International Journal of Heat and Fluid Flow, Vol. 74 (2018), pp. 187-197.

P. Ziadé, M. Feero, P. Lavoie, P. Sullivan, *Shear Layer Development, Separation, and Stability Over a Low-Reynolds Number Airfoil*, ASME J. Fluids Eng., Vol. 150(7) (2018): 071201-071201-12.

P. Ziadé, P. Sullivan, *Sensitivity of the Orr-Sommerfeld Equation to Base Flow Perturbations With Application to Airfoils*, International Journal of Heat and Fluid Flow, Vol. 67 PB (2017), pp. 121-129.

CONFERENCE PAPERS & PRESENTATIONS

L. Long, R. Javaji, W. Nelson, J. Edwards, **P. Ziadé**, C. Morton, C. Johansen, *Development of a facility to test an ejector ramjet at static conditions*, AIAA Aviation Forum. Chicago, Illinois, USA. June 27-July 1, 2022 (Accepted).

H. De Lima Gambassi, **P. Ziadé**, C. Morton, *Sparse Sensor-based Flow Estimation Using Artificial Neural Networks and Spectral Proper Orthogonal Decomposition*, APS Division of Fluid Dynamics Annual Meeting. Phoenix, Arizona, USA. November 21-23, 2021.

B. Dalman, A. Korobenko, **P. Ziadé**, A. Ramirez-Serrano, C. Johansen. *Validation and verification of a conceptual design tool for evaluating small-scale, supersonic, unmanned aerial vehicles*. AIAA

Aviation Forum. Washington, D.C., USA. June 7-11, 2021.

H. Stoldt, C. Johansen, A. Korobenko, **P. Ziadé**. *Verification and Validation of a High-Fidelity Open-Source Simulation Tool for Supersonic Aircraft Aerodynamic Analysis*. AIAA Aviation Forum. Reno, USA. June 15-19, 2020.

J. Wang, **P. Ziadé**, G. Huang, P. Sullivan. *Bi-Global Stability Analysis on a NACA 0025 Airfoil at a Reynolds Number of 100,000*. 11th International Symposium on Turbulence and Shear Flow Phenomena (TSFP11). Southampton, U.K. July 30-Aug 2, 2019.

S. Li, G. Gress, **P. Ziadé**. *Reflecting on the Use of Design Methodology in Engineering Design Education*. 2019 Canadian Engineering Education Association (CEEA-ACEG2019) Conference. Ottawa, Ontario, Canada. June 8-12, 2019.

H. Stoldt, C. Johansen, A. Korobenko, **P. Ziadé**. *Validation of rhoCentralFoam for Aerodynamics Simulations of Supersonic Aircraft*. Okanagan Fluid Dynamics Meeting. Canmore, Alberta, Canada. April 26-28, 2019.

G. Doerksen, W. Hinman, **P. Ziadé**, C. Johansen. *A One-dimensional Model for Incompressible Coaxial Confined Jet Entrainment*. Okanagan Fluid Dynamics Meeting. Canmore, Alberta, Canada. April 26-28, 2019.

J. Chaban, S. Dubova, **P. Ziadé**, P. Sullivan. *Local and Bi-Global Stability of a Simulated Channel Flow*. Proceedings of the ASME Fluids Engineering Division Summer Meeting. Montreal, Quebec, Canada. July 15-20, 2018.

P. Ziadé, M. Feero, P. Sullivan. *Influence of Cavity Shape on Synthetic Jet Performance*. Physics and Control of Turbulent Shear Flow, New York City, USA, July 10-11, 2017.

P. Ziadé, P. Sullivan. *Experimental and Numerical Comparison of Transition for Low-Reynolds Number Airfoils*. 10th International Symposium on Turbulence and Shear Flow Phenomena (TSFP10), Chicago, USA, July 6-9, 2017.

P. Ziadé, P. Sullivan. *Sensitivity of the Rayleigh and Orr-Sommerfeld Equations to Changes in Base Flow*. 24th International Congress of Theoretical and Applied Mechanics. Montreal, Quebec, Canada. Aug 21-26, 2016.

P. Ziadé, P. Sullivan. *Sensitivity of the Orr-Sommerfeld equation to changes in base flow*. Symposium on Experiments and Simulations in Fluid Dynamics Research. Kingston, Ontario, Canada. Aug 19-20, 2016.

P. Ziadé, P. Sullivan. *Stability and Transition Over a Low-Reynolds Number Airfoil*. Proceedings of the ASME Fluids Engineering Division Summer Meeting. Washington, DC. July 10-14, 2016.

P. Ziadé, P. Sullivan. *Large-Eddy Simulation of turbulent round jets in crossflows*. Proceedings of the 25th Canadian Congress on Applied Mechanics, London, Ontario, Canada, May 31-June 4, 2015.

P. Ziadé, P. Sullivan. *The Effect of Synthetic Jet Actuation on Transverse Jets*. Thousand Islands Fluid Dynamics Meeting, Gananoque, Ontario, Canada, May 1-3, 2015.

P. Ziadé, C. Devaud. *Large-Eddy Simulation of a spatially-developing compressible jet*. Combustion Institute - Canadian Section Technical Meeting, Ottawa, Ontario, Canada, May 2010.

INVITED TALKS

P. Ziadé, P. Sullivan. *Aerodynamic control for low Reynolds number flows*. Mechanical and Materials Engineering Graduate Seminar Series. Western University. London, Ontario, Canada. Nov 9, 2015.

M. Feero, **P. Ziadé**, P. Lavoie, P. Sullivan. *Active control of separation on a low Reynolds number airfoil using synthetic jet actuation*. Core Engineering, Bombardier Aerospace, Dec 17, 2014.

PROFESSIONAL
AFFILIATIONS

- Member, American Institute of Aeronautics and Astronautics
- Member, SAE International
- Member, American Physical Society

SERVICE ACTIVITIES

- TUCFA Representative, Department of Mechanical & Manufacturing Engineering, Schulich School of Engineering
- Energy Engineering Program Committee, Schulich School of Engineering
- Departmental Planning Committee, Department of Mechanical & Manufacturing Engineering, Schulich School of Engineering
- Schulich School of Engineering Undergraduate Scholarship Committee
- Undergraduate Studies Committee, Department of Mechanical & Manufacturing Engineering, Schulich School of Engineering
- Rocky Mountain Thermofluids Meeting (www.rockymountainfluids.com) - Co-Organizer
- University of Calgary Formula SAE Team - Faculty Advisor
- Chair, Engineering Undergraduate Studies Committee
- Program Director, Aerospace Engineering Minor
- Reviewer: *Aerospace Science and Technology*, *Computers & Fluids*, *Journal of Computational Physics*, *Experimental Thermal and Fluid Sciences*, *Journal of Turbulence*, *AIAA Journal*.

COMPUTER SKILLS

- Programming Languages: C, C++, FORTRAN, Python, MATLAB, Unix shell scripts, SQL
- Engineering: Abaqus, ANSYS CFX and FEA, OpenFOAM, Paraview, Gmsh
- Mathematical: MATLAB, Maple, MathCad
- Operating Systems: Unix/Linux, Windows

LANGUAGES

- English - Fluent (written & spoken)
- French - Fluent (written & spoken)