

CURRICULUM VITAE

ARMAN HEMMATI, PHD, P.ENG.

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RESEARCH INTERESTS

Computational Fluid Dynamics, Sustainable Thermal Engineering Systems, Bio-inspired Engineering, Aero/Hydrodynamics, Future Energy Systems, Alternative Energies, Sustainable Transportation Vehicles.

EDUCATION AND TRAINING

- PDF. Mechanical and Aerospace Engineering.** Princeton University (2016-2018)
Research: *Bio-inspired underwater swimming design, urban heat centers, vertical wind turbines.*
Supervisor: Prof. Alexander J. Smits
- PhD. Mechanical Engineering.** University of Calgary, Canada (2011-2016) **GPA 4.0/4.0**
Thesis: *Evolution of Large-Scale Structures in the Wake of Sharp-Edge Bluff Bodies*
Supervisor: Prof. David H. Wood
- B.Sc. Mechanical Engineering.** University of Calgary, Canada (2006-2011) (*Distinction*) **GPA 3.8/4.0**
BSc. Project: *P.V. Panel Wind Loads – Aerodynamics of Flat Plates at High Angles of Attack*
Advisor: Prof. David H. Wood

HIGHLIGHTED ACADEMIC ACHIEVEMENTS

- Total number of HQPs = **65** (6 PDF + 9 PhD + 18 MSc + ...)
- Publications = **65+** Journal Papers & **30+** Conference Proceedings
- Teaching Experience = **10 courses** (2014 – present) with **Student Evaluation** average of **4.6/5**
- Collaborations = Los Alamos National Lab, Natural Resources Canada (NRCan), ExxonMobil, Enbridge, TC Energy, Canada's Oil Sands Innovation Alliance (COSIA), ...
- Funding = secured a total of ~**\$16.0M** (\$5M as PI / \$11M as Co-Appl.), and **\$24.5M** under review
- Public engagements = **TEDxUalberta** (2020), **Vue Weekly** (2018), **United Nations - UNFCCC** (2015)
- Service = **Co-Chair of Univ. Appeal Board**, **APEGA PD Webinars**, **Hiring Committees**, **2022 CSME International Congress**, **Advisor to UofA Student Rocketry Research Team (STARR)**, ...
- **Professional Engineer** registered in Alberta, Canada (APEGA) since 2018

ACADEMIC EXPERIENCE

- **UA Eng. Research Chair: Emissions Reduction Technologies** **July 2023 - Present**
- **Associate Professor** (Early Tenured on Nov 2021) **July 2022 - Present**
- **Assistant Professor** (Tenure-Track) **January 2018 – July 2022**
University of Alberta (Dept. of Mechanical Engineering, Faculty of Engineering)

- Three main research themes are Energy Systems, Turbulent Pipeflow, Fluid-Structure-Interactions and Fundamentals of Unsteady Turbulent Flow Dynamics & Wakes.
 - Computational Fluid Dynamics¹ = **35 HQP** | **60+ Journal Publications** | 30+ Conf. Proceeding
 - Unsteady Turbulent Wakes¹ = **13 HQP** | **27 Journal Publications** | 21 Conf. Proceeding
 - Turbulence Modeling¹ = **7 HQP** | **15+ Journal Publications** | 15 Conf. Proceeding
 - Bio-inspired Hydrodynamics¹ = **6 HQP** | **20+ Journal Publications** | 13 Conf. Proceeding
 - Pipelines & Turbulent Pipeflow¹ = **5 HQP** | **6 Journal Publications** | 3 Conf. Proceeding
 - Cardiovascular Flows¹ = **5 HQP** | **3 Journal Publications** | 2 Conf. Proceeding
 - Wind Energy & Aerodynamics¹ = **3 HQP** | **6 Journal Publications** | 3 Conf. Proceeding
 - Water Treatment¹ = **3 HQP** | **5 Journal Publications** | 2 Conf. Proceeding
 - Forest Fire Modelling¹ = **2 HQP** | **3 Journal Publications** | 3 Conf. Proceeding
- Total research funding: ~**\$5M+** (active - PI), **\$11M** (active – Co-Appl.), **\$25.5M** (under-review/negotiation)
- Students Supervision:
 - Current: **23 HQPs = 3 PDF + 7 PhD + 8 MSc + 3 M.Eng. + 4 R.A.**
 - Completed: **39 HQPs = 3 PDF + 2 PhD + 12 MSc + 4 M.Eng + 10 BSc. + 8 R.A.**
 - Finishing: **4 HQPs = 2 PhD (Jan. 2024) + 2 MSc (Jan. 2024)**
 - New Recruits: **7 HQPs = 2 PDF (W2024), 1 PhD (W2024) + 2 MSc (W2024) + 2 R.A. (W2024)**
- Teaching experiences: 10 courses with an average of 70 students per course
 - The Universal Student Rating of Instructions (USRI) average = **4.6/5.0**
 - **Max. USRI = 5/5**
 - More details listed under Teaching Experiences
- Selected Academic service / referee experience:
 - Co-Chair of 2022 Canadian Society for Mech. Engineering (CSME) International Congress (*Federal*)
 - Co-Chair of the CSME Biomedical Engineering Technical Advisory Board (*Federal*)
 - Symposium Chair of 2021 CSME Congress Fluid Mechanics Symposium (*Federal*)
 - Ontario Research Fund Engineering Panel – Evaluation Committee (*Provincial*)
 - Co-Chair of the University of Alberta Appeal Board (*Institutional*)
 - Co-Chair of the Future Energy System Institute Strategic Research Advisory Board (*Institutional*)
 - Future Energy Research Advisory Committee (*Institutional*)
 - Alberta Innovation Scholarship Evaluation Committee (*Institutional*)
 - Faculty of Graduate Studies Posted Competition Committee (*Institutional*)
 - Mechanical Engineering Graduate Programming Committee (*Departmental*)
 - Mechanical Engineering Scholarship Committee (*Departmental*)
 - Mechanical Engineering Nomination Committee (*Departmental*)

¹ Categories listed here may overlap.

- Undergraduate services: STARR Rocketry Competition Undergraduate Club
- Public Engagements:
 - APEGA PDF Webinars (2021 & 2022)
 - World University Network (2019)
 - Center for Global Education: Alberta High schools (2019)
 - **TEDxUalberta**: Climate Change, Technology and Policy (2020)
 - **Invited Talk** for Annual Meeting of **Association of Prof. Engineers & Geologists of Alberta** (2019)
- Notable recognitions:
 - UA Engineering Research Chair (2023)
 - UofA Engineering Early Career Research Award (Dept. Nominee - 2019)
 - Imperial Research Award (Awarded - Summer 2019)
 - CSME Faculty Spotlight (Published - Summer 2020)
 - Public Recognition from Alberta Premier (Governor) on research excellence (Published – Fall 2020)

• **Research Affiliate** January 2018 – June 2020

Princeton University (*Dept. of Mechanical and Aerospace Engineering*)

- Research topics: Bio-inspiration in swimming and Pipeflow Respose and recovery
- Research-related collaborations and computational resource sharing

• **Post-Doctoral Research Fellow** June 2016 – January 2018

Princeton University (*Dept. of Mechanical and Aerospace Engineering – Prof. A.J. Smits*)

- Main Research Topics
 - Bio-inspiration in development of underwater propulsors and energy harvesters
 - Hydrodynamics and unsteady wake dynamics of tailfins in fish swimming
- Multi-University-Research-Initiative (MURI) Project: U.S. Office of Naval Research
 - Involved 5 top-tier universities: Harvard Univ., Princeton Univ., Univ. of Virginia, Lehigh Univ. & West Chester Univ.
- Numerical (CFD) study of tail-fin locomotion using **OpenFOAM** coupled with PIV experiments at a range of Reynolds numbers and oscillation frequencies and amplitudes

• **Research Associate** January 2016 – May 2016

University of Calgary (*Dept. of Mechanical and Manufacturing Engineering - Prof. D.H. Wood*)

- Research Topic: Impact of wake dynamics on surface pressure fluctuations for PV Modules
- CFD simulation of the flow past PV modules at high angles of attack using ANSYS, OpenFOAM

• **Sessional Instructor** January 2014 – January 2015

University of Calgary (*Dept. of Mechanical and Manufacturing Engineering*)

- Mechanics of Solids (ENGG 317) had 90 students + Included laboratories

- Finite Element Method (ENME 547) had 29 students + Redesigned the course to include CFD
- Nominated for the University of Calgary Teaching Award by the Dept. Head
- Awarded a teaching grant from the Engineering School Dean's Office to establish the **High-Power Computing Lab** in the Department of Mech. & Manuf. Engineering (**\$100k in funding**)

• **Research Assistant – PhD Candidate**

September 2011 – January 2016

University of Calgary (*Dept. of Mechanical and Manufacturing Engineering* – Prof. D.H. Wood)

- Thesis Title: Evolution of Large-Scale Structures in the Wake of Sharp-Edge Bluff Bodies
- Study of unsteady wake of sharp-edge bluff bodies & turbine blades using CFD & experiments
- Expertise in Direct Numerical Simulation (DNS) and Large Eddy Simulation (LES)
- Software: ANSYS CFX, OpenFOAM, COMSOL Multiphysics, MATLAB, Tecplot, etc.
- **Designed** (partially), **Manufactured, Assembled** and **Tested** the UofC LTRAC Red Wind Tunnel: 3.2 ft × 3.2 ft × 3.2 ft Test Section + Adjustable wind speed of 10-60 ft/s
- Experienced with Hotwire **Anemometry, LDV, PIV, Force & Pressure Transducers**

TEACHING EXPERIENCE

• **University of Alberta** (*Dept. of Mechanical Engineering*)

1. Finite Element Method for Mech. Eng. (MEC E 563)		Winter 2023		USRI = 4.5/5
2. Applied Computational Fluid Dynamics (MEC E 539)		Winter 2023		USRI = 4.6/5
3. Finite Element Method for Mech. Eng. (MEC E 563)		Summer 2022		USRI = 5.0/5
4. Applied Computational Fluid Dynamics (MEC E 539)		Winter 2022		USRI = 4.5/5
5. Finite Element Method for Mech. Eng. (MEC E 563)		Winter 2022		USRI = 4.5/5
6. Applied Computational Fluid Dynamics (MEC E 539)		Winter 2021		USRI = 3.8/5
7. Finite Element Method for Mech. Eng. (MEC E 563)		Winter 2021		USRI = 4.6/5
8. Mechanical Engineering Lab 1 (MEC E 301)		Summer 2020		USRI = 4.6/5
9. Applied Computational Fluid Dynamics (MEC E 539)		Winter 2020		USRI = 4.8/5
10. Mechanical Engineering Lab 1 (MEC E 301)		Winter 2020		USRI = 4.4/5
11. Applied Computational Fluid Dynamics (MEC E 539)		Winter 2019		USRI = 4.3/5
12. Mechanical Engineering Lab 1 (MEC E 301)		Winter 2019		USRI = 4.4/5

(COVID-19)

• **University of Calgary** (*Dept. of Mechanical & Manufacturing Engineering*)

13. Mechanics of Solids (ENGG 317)		Winter 2014		USRI = 5.5/7
14. Finite Element Method (ENME 547)		Fall 2014		USRI = 4.8/7

• **NSERC Undergrad. Student Research Award**

May 2018 – Sept. 2018

SELECTED RESEARCH GRANTS**Under-Review / Negotiations:****Total Funding Requested = \$25.5M**

- **NFRF-Transformation** (\$24M – PI)

Topic: “A new platform to address forest fire prediction, mitigation and adaptation”

Partners: UofA, Los Alamos Nat. Lab, UCSD, SFU, UWaterloo, UofC, NRCan, Env. Canada, ...

- **NSERC Alliance & MITACS** (\$1M – PI)

Topic: “New computational and experimental tools for development of novel propulsion and turbomachinery systems”

Partners: major Canadian-American aerospace industry leader

- **NSERC Alliance & AI CASBE** (\$500k – PI)

Topic: “A new power harvesting for geothermal systems”

Partners: Joint Venture of U.K. and Canadian start-ups & Oxford University

Awarded:**Total Funding Received ≈ \$15.9M**

- **NSERC Discovery Grant** (Total of \$220k as \$44k/year - PI)

March 2020 – March 2025

- The largest grant awarded to an assistant professor in the Dept. at the Univ. of Alberta.

- **NSERC Discovery Early Career Supplement** (\$12k - PI)

March 2020 – March 2025

- **Canada Digital Alliance – Resource Allocation** (\$150k - PI)

March 2023 – March 2026

- **Japanese JOIN/NEDO** (\$11M – Co-Applicant/Researcher)

Oct. 2023 – March 2028

- Industry Partner: 
- Title: “Intelligent snow removal using low-emissions machinery in Edmonton, AB”

- **NSERC Alliance** (\$2M - PI)

Aug. 2022 – Aug. 2026 + 1 year extension

- Industry Partner: 
- Title: “Propagation of flow induced vibrations and stresses on pipe joints approaching angled junctions”

- **Alberta Innovates – CASBE** (\$500k - PI)

Nov. 2023 – Nov. 2025

- Industry Partner: 
- Title: “A novel two-layer machine-learning-based leak detection system for pipelines”

- **Alberta Innovates – Clean Technology Intake** (\$200k - PI)

Feb. 2023 – Feb. 2026

- Industry Partner: 
- Title: “Fourier Casing – a new technology to reduce heat losses in geothermal processes”

2. [REDACTED] *Currently at Lakehead University* Sep. 2018 – Aug. 2019
Projects: Bio-inspired swimming locomotion in heaving foils, heat transfer in manipulated turbulent pipeflow
3. [REDACTED] *Currently at Lakehead University* Jan. 2021 – Aug. 2022
Projects: Bio-inspired swimming locomotion in tandem fish, Fluid-Structure Interaction modelling of oscillating flexible hydrofoils
4. [REDACTED] *University of Alberta* Oct. 2022 – Present
Projects: Cooling of solar collectors, and conjugate heat transfer in concentrated solar energy harvesting systems.
5. [REDACTED] – *University of Alberta* Dec. 2022 – Present
Projects: Unsteady wake of oscillating foils, tandem foils and a universal scaling law for fish schools.
6. [REDACTED] – *University of Alberta* May 2023 - Present
Projects: Non-linear dynamic modeling of undulating foils in viscoelastic medium
7. [REDACTED] – *University of Alberta* Confirmed for Jan 2024
Projects: Reduced-Order-Modeling of pipeflow with and without leaks
8. [REDACTED] – *University of Alberta* Starting in May 2024
Projects: ML-algorithms for pipe leak detection mechanism

DOCTORAL DEGREE

1. [REDACTED] *University of Alberta (Co-Supervision)* **Graduated: May 2021**
Thesis: Numerical investigation of thermally driven thin film instabilities
Focus: Water Treatment and Nano-Fluidic Models
Co-Supervisor: Dr. Mohtada Sadrzadeh – University of Alberta
2. [REDACTED] – *University of Alberta* **Graduated: Dec. 2022**
Thesis: Evolution of vortex structures in the wake of oscillating foils with multi-degree motion
Focus: Fish Swimming, Bio-Inspiration of Aerial and Ground Autonomous Vehicles, GHG Emissions Reduction
3. [REDACTED] *University of Alberta* Exp. Grad.: Jan. 2024
(Candidacy Completed)
Thesis: Evolution of interactive wakes in fish schools: side-by-side foils
Focus: Fish Swimming, Bio-Inspiration of Aerial and Ground Autonomous Vehicles, GHG Emissions Reduction
4. [REDACTED] *University of Alberta* Exp. Grad.: July 2024
(Candidacy Completed)
Thesis: Forest Fire Modeling using a multi-fuel sub-grid closure
Focus: Forest Fire and Climate Change Adaptation
Co-Supervisor: Dr. Rod Linn – Los Alamos National Laboratory, NM, USA

5. [REDACTED] *Amirkabir Univ. Technology* (Co-Supervision) Exp. Grad.: Sept. 2024
(Candidacy Completed)
Thesis: Electromagnetically-Induced vortex dynamics in turbulent pipeflow
Focus: Alternative Energy Transportation, Pipelines, GHG Emissions Reduction
Co-Supervisor: Dr. Mohammad Saeedi – Amirkabir Univ. Technology, Iran

6. [REDACTED] *University of Alberta* Exp. Grad.: Jan. 2024
(Candidacy Completed)
Thesis: Unsteady wake evolution of wall-mounted sharp-edge bodies
Focus: Future Energy Systems, Aerodynamics, Ground Vehicles, GHG Emissions Reduction

7. [REDACTED] – *University of Alberta* Exp. Grad: Sept. 2027
Thesis: Flow induced stresses in spiral pipes with bends
Focus: Pipeflow, Responsible Hydrocarbons, GHG Emissions Reduction

8. [REDACTED] – *China University of Petroleum, Beijing* (Exchange) Aug. 2023 – Sept. 2024
Thesis: Intelligent Real-Time Kick Warning and Formation Parameters Inversion Model during Drilling
Focus: Energy transport and GHG emissions reduction
Supervisor: Dr. Xianzhi Song - *China University of Petroleum, Beijing*
Funding: China Scholarship Council (CSC)

9. [REDACTED] – *Sun-Yat Sen University, China* (Exchange) Dec. 2023 – Dec. 2024
Thesis: Fish school non-linear dynamics
Focus: fish swimming, bio-inspired design, and GHG emissions reduction
Funding: China Scholarship Council (CSC)

10. [REDACTED] – *University of Alberta* Exp. Grad.: May. 2028
(Starting May 2024)
Thesis: Unsteady wake of oscillating flexible foils for fish schools
Focus: Fish Swimming, Bio-Inspiration of Aerial and Ground Autonomous Vehicles, GHG Emissions Reduction

MASTERS DEGREE

1. [REDACTED] – *University of Alberta* (M.Eng.) **Graduated: May 2019**
Report: The performance of turbulence models in predicting wind loads on solar collectors
Focus: Future Energy Systems, Solar Energy, GHG Emissions Reduction

2. [REDACTED] *University of Alberta* **Graduated: Sept. 2020**
Thesis: The implications of coarctation and indentation of the aorta on blood flow characteristics in pediatric patients
Focus: Biological flows and Biomedical Devices

3. [REDACTED] – *University of Alberta* **Graduated: Sept. 2020**
Thesis: Characterization of the wake of large depth-ratio cylinders at low Reynolds numbers
Focus: Future Energy Systems, Aerodynamics, Ground Vehicles, GHG Emissions Reduction

4. [REDACTED] – *University of Alberta* **Graduated: Sept. 2020**
Thesis: Response and recovery of turbulent pipeflow past square bar roughness elements
Focus: Non-Electric Infrastructure, Pipelines, GHG Emissions Reduction

5. [REDACTED] – *University of Alberta* **Graduated: June 2021**
Thesis: Implications of Reynolds number on recovery of turbulent pipeflow with targeted wall shapes
Focus: Non-Electric Infrastructure, Pipelines, GHG Emissions Reduction

6. [REDACTED] – *French Air and Space Force Academy (Summer Intern)* **Graduated: June 2022**
Project: Drone NanoSat Deployment System: Conceptual Design
Focus: Aerospace, Aerodynamics and Flight

7. [REDACTED] – *University of Alberta* **Graduated: Sept. 2022**
Thesis: Implications of targeted wall shapes on improved heat transfer of turbulent pipeflow for geothermal applications
Focus: Future Energy Systems, Geothermal, GHG Emissions Reduction

8. [REDACTED] *University of Alberta* **Graduated: Dec. 2022**
Thesis: A new model to characterize a Luminescent solar concentrator for higher efficiency power generation
Focus: Future Energy Systems, GHG Emissions Reduction

9. [REDACTED] – *University of Alberta* **Graduated: Dec. 2022**
Thesis: Fourier-Averaged Navier-Stokes analysis of unsteady turbulent wakes: a new flow stability model
Focus: Fundamental Flow Dynamics, Numerical Modeling

10. [REDACTED] – *University of Alberta* **Graduated: Dec. 2022**
Thesis: A flow correction algorithm for the wake of buildings using machine learning
Focus: Future Energy Systems, GHG Emissions Reduction, Wakes

13. [REDACTED] – *Aachen University / University of Alberta* **Graduated: Sep. 2023**
Thesis: *Electro-Magentically Induced Flow Dynamics*
Focus: Propulsion and Multi-physics modeling

11. ██████████ *University of Alberta* Exp. Grad: Dec. 2023
Thesis: Optimization of Thermo-Osmotic Energy Conversion (TOEC) system
Focus: Future Energy Systems, GHG Emissions Reduction, Water Treatment
Co-Supervisor: Dr. Mohtada Sadrzadeh – University of Alberta

12. ██████████ – *University of Alberta* Exp. Grad: Jan. 2024
Thesis: Bloodflow manipulators to reconfigure walls of the aorta in children
Focus: Biological flows and Biomedical Devices
Co-Supervisor: Dr. Michelle Noga MD – University of Alberta Hospital

14. ██████████ – *University of Alberta* Transferred: May 2023
Thesis: Flow induced vibration in turbulent pipeflow with targeted wall-shaped
Focus: Non-Electrical Infrastructure, Pipeline, GHG Emissions Reduction
Co-Supervisor: Dr. Muhammad S.U. Khalid – Univ. of Alberta / Lakehead U.

15. ██████████ – *University of Alberta* Exp. Grad: Sep. 2024
Thesis: Economic modeling and government incentives for geothermal energy systems in Alberta
Focus: Energy Economics, Sustainable Energy, GHG Emissions Reduction
Co-Supervisor: Dr. Tim Weis – University of Alberta

16. ██████████ – *University of Alberta* Exp. Grad: May 2024
Thesis: Aerodynamics of wing-body interactions in rotary drones
Focus: Aerodynamics, GHG Emissions Reduction

17. ██████████ – *University of Alberta* Exp. Grad: Jan 2025
Thesis: Flow induced stresses in spiral pipes with bends
Focus: Pipeflow, Responsible Hydrocarbons, GHG Emissions Reduction

18. ██████████ *University of Alberta* Exp. Grad: Jan 2025
Thesis: Drone Fix Wing Design
Focus: Wing Design, Aerodynamics, Drones

19. ██████████ – *University of Alberta* Exp. Grad: Sep. 2025
Thesis: Design optimization of Fourier Casing
Focus: Pipeflow manipulation for emissions reduction

20. ██████████ – *University of Alberta* Exp. Grad: Sep. 2025
Thesis: Machine-Learning algorithms for prediction of crack in bent pipes
Focus: Pipeflow and pipeline prediction for emissions reduction

21. [REDACTED] – *University of Alberta* Exp. Grad: Jan. 2026
Thesis: Energy distributions in FANS analysis of turbulent flows
Focus: Fundamentals of turbulent flow dynamics
22. [REDACTED] – *University of Alberta* Exp. Grad: Jan. 2026
Thesis: Fluid-structure-interaction modeling of pipes with turbulent flow
Focus: Pipeflow and pipeline prediction for emissions reduction

BACHELOR DEGREE:

1. [REDACTED] – *University of Alberta* May. 2018 – Sept. 2018
Project: Bloodflow simulation in aortas with geometrical anomalies
Focus: Biological flows and Biomedical Devices
Program: NSERC Undergraduate Summer Research Award
2. [REDACTED] *University of Alberta* May. 2018 – Sept. 2018
Project: Generating spatial mesh from 3D MRI scans in children
Focus: Biological flows and Biomedical Devices
Program: NSERC Undergraduate Summer Research Award
3. [REDACTED] *University of Alberta* Sept. 2019 – May 2019
Project: Scaling of tandem pitching foil in in-line configuration
Focus: Fish Swimming, Bio-Inspiration of Aerial and Ground Autonomous Vehicles, GHG Emissions Reduction
Program: UofA Dean's Research Award
4. [REDACTED] – *University of Alberta* May. 2020 – Sept. 2020
Project: Reynolds number terms in scaling relationship of oscillating foils
Focus: Fish Swimming, Bio-Inspiration of Aerial and Ground Autonomous Vehicles, GHG Emissions Reduction
5. [REDACTED] – *University of Alberta* May. 2020 – May 2021
Project: Bloodflow simulation in the aorta using RANS models
Focus: Biological flows and Biomedical Devices
Program: UofA Dean's Research Award
6. [REDACTED] *Universidad de Ingenieria Tecnologia* Dec. 2021 – May 2022
Project: Multi-stage horizontal axis wind turbines based on bio-inspiration from fish schools
Focus: Future Energy Systems, Wind Energy, GHG Emissions Reduction
Program: Emerging Leaders in the Americas Program (ELAP)

7. [REDACTED] – *University of Alberta (Dept. Civil & Environmental Eng.)* Sept. 2021 – Dec. 2021
Project: Economic feasibility study of geothermal-energy-based water treatment in remote communities of Alberta
Focus: Future Energy Systems, Water Treatment, GHG Emissions Reduction

8. [REDACTED] – *Univ. De Ingenieria Y Tecnologia, Peru (Summer Intern)* March 2022 – June 2022
Project: Bio-inspired multi-stage vertical wind turbine aerodynamics
Focus: Future Energy Systems, GHG Emissions Reduction
Funding: Emerging Leaders in the Americas Program, Global Affairs Canada

9. [REDACTED] – *Indian Institute of Technology Kharagpur (Mitacs GlobalLink)* April 2022 – Aug. 2022
Project: Bio-inspired multi-stage vertical wind turbine aerodynamics
Focus: Future Energy Systems, GHG Emissions Reduction
Funding: Mitacs GlobalLink Summer Internship

10. [REDACTED] – *IIT Kharagpur (Mitacs GlobalLink)* April 2022 – Aug. 2022
Project: Aerodynamics of trailer trucks – side wind gust
Focus: Aerodynamics, GHG Emissions Reduction
Funding: Mitacs GlobalLink Summer Internship

11. [REDACTED] – *IIT Kharagpur (Mitacs GlobalLink)* April 2023 – Aug. 2023
Project: Fish schools and wake dynamics
Focus: Aerodynamics, GHG Emissions Reduction, bio-inspiration in future energy systems
Funding: Mitacs GlobalLink Summer Internship

12. [REDACTED] – *University of Alberta (Research Intern)* April 2023 – Present
Project: EM-Trustors for fluid transport
Focus: New technologies for emissions reduction

13. [REDACTED] – *University of Alberta (Coop-Student)* Sept. 2023 – Present
Project: EM-Trustors and Drone Aerodynamics
Focus: Drone aerodynamics to lower GHG Emissions

14. [REDACTED] – *Univ. De Ingenieria Y Tecnologia, Peru (Intern)* Nov. 2023 – March 2024
Project: Bio-inspired multi-stage vertical wind turbine aerodynamics
Focus: Future Energy Systems, GHG Emissions Reduction
Funding: Emerging Leaders in the Americas Program, Global Affairs Canada

RESEARCH ASSOCIATES & VISITING RESEARCHERS:

1. ██████████ – *University of Alberta* Apr. 2018 – Sept. 2018
Project: Hydrodynamics of teardrop foils under heaving motion
Present Position: Assistant Professor at Lakehead University, ON, Canada
2. ██████████ – *University of Alberta* May 2018 – Sep. 2018
Project: Wind Atlas Models for Canada
Present Position: PhD Candidate at University of Paris, France
3. ██████████ *University of Alberta* Sept. 2020 – Jan. 2021
Project: Bloodflow simulation methods using fast-track techniques
Present Position: Research Assistant, Dept. of Civil & Mining Eng., UofA
4. ██████████ *University of Alberta* Dec. 2020 – Apr. 2021
Project: The unsteady wake of wall-mounted prisms
Present Position: CFD Researcher, Energy Systems Design Lab, Edmonton
5. ██████████ – *University of Alberta* April 2021 – Aug. 2021
Project: Thermocapillary patterning of non-Newtonian thin films
Present Position: CFD Research Engineer, Pipewise Technology, Calgary, AB
6. ██████████ – *Peking University, China* (Visiting PDF) Sept. 2020 – Jan. 2021
Project: Hydrodynamics and kinematics of swimming fish
Present Position: Research Associate at the University of Alberta
7. ██████████ – *University of Alberta* July 2021 – Sept. 2021
Project: Direct Numerical Simulation of Pipeflow with targeted wall-shapes
Present Position: Project Assistant, PeerRide Inc., Edmonton, AB
8. ██████████ – *University of Alberta* Sept. 2022 – Dec. 2022
Project: Flow induced vibration and stresses in pipes
9. ██████████ *Bahauddin Zakariya University / University of Alberta* Aug. 2022 – Sept. 2023
Project: non-linear modeling of flow over oscillating bodies
10. ██████████ – *University of Alberta* Dec. 2022 – Feb 2023
Project: Fixed-Wing on a multi-rotor drone
11. ██████████ – *University of Alberta* Dec. 2022 – Present
Project: FANS technique applications in unsteady flows

EXAMINATION / REVIEW EXPERINCES

- **PhD:** 12+ Thesis Defense Exams & 13+ Candidacy Oral Exams (*University of Alberta*)
- **MSc:** 25+ Thesis Defense Exams (*University of Alberta*)
- **Exam Chair:** 10+ Doctoral Oral Defense, 7+ Doctoral Candidacy & 8+ Masters Defense

- **Editorial Board:**

- *Energies*

- **Journal Referees:**

- *Physical Review Fluid,*
- *Physical Review E.,*
- *Journal of Fluid Mechanics,*
- *Physics of Fluids,*
- *Journal of Wind Engineering & Ind. Aerodynamics,*
- *International Journal of Heat & Fluid Flow,*
- *Journal of Applied Mechanics,*
- *Journal of Turbulence,*
- *Computations,*
- *Energies,*
- *Journal of Applied Physics,*
- *Ocean Engineering,*
- *Progress in Computational Fluid Dynamics*
- *Computational & Theoretical Fluid Dynamics,*
- ...

- **Grants Committees:**

- *Future Energy Systems Institute Research Advisory Council ,*
- *Ontario Research Fund Engineering Panel, ...*

SELECTED HONORS & AWARDS

- **Outstanding Reviewer Award (Institute of Physics, IOP)** 2020 & 2021
- **TEDxUAlberta Speaker 2020** July 2020
- **Imperial Oil University Research Award** May 2020 – May 2023
- **Faculty of Eng. Early Career Research Award (*Dept. nomination*)** 2019
- **NSERC Post-Doctoral Fellowship** June 2016 – June 2018
- **Alberta Innovate Technology Future (AITF) Ingenuity Fellow** May 2013 – January 2016
- **University of Calgary Eyes-High Leadership Scholar** May 2014 – January 2016
- **NSERC PGS M Pre-Doctoral Graduate Fellow** May 2012 – May 2013
- **Awards Recipient for Teaching Excellence** 2011 & 2014
- **Jason Lang Scholarship Recipient** 2009 – 2011
- **NSERC Undergraduate Student Research Award (*declined*)** 2008
- **Alberta Undergraduate Blue-Cross Scholarship Recipient** 2006 – 2008

- Engineering Dean's List for Academic Excellence 2006 - 2011

ACADEMIC COMMITTEE MEMBERSHIPS

- University of Alberta Faculty Hiring Committee June 2023 - Present
- University of Alberta Appeals Board (Chair) September 2021 - Present
- Future Energy Systems Institute Research Advisory Council September 2020 - Present
- University of Alberta Dept. of Mech. Eng. Nomination Committee January 2020 - Present
- Canadian Society for Mechanical Engineering (CSME) – Technical Adv. Board September 2018 - Present
- CSME Congress – Sym. of Fluid Mechanics: Co-Chair September 2019 - Present
- University of Alberta Dept. of Mech. Eng. Graduate Programming Committee January 2019 - August 2020
- Alberta Innovation Scholarship Evaluation Committee 2019 & 2020
- Ontario Research Fund Engineering Panel – Evaluation Committee 2019
- University of Alberta Faculty of Grad. Studies Poster Competition Committee 2019
- Schulich School of Eng. Diversity and Equality Committee (*Advisory to Dean*) January 2015 - Dec. 2015
- Schulich School of Eng. Safety Improvement Committee (*Advisory to Dean*) April 2015 - January 2016
- Chair of 9th and 10th Annual Mechanical Engineering Research Conference 2013 - 2014
- Engineering Dean Search Committee 2013
- Executive Team of 24th Conference of the CFD Society of Canada 2012

WORK EXPERIENCE

- **President & Principal Simulation Engineer** May 2016 - Present
AeroEnergy Consulting Ltd.
 - Providing expertise consulting on design and engineering of various products, processes and technologies.
 - Projects completed range from CFD & FEM simulations for feasibility studies of new technologies, and CAD model development for new engineering designs.
 - Related engineering fields are aerospace, energy, manufacturing, pipelines, HVAC, etc.
- **Board Member: Technical Advisory** November 2019 - Dec. 2020
Infinidium Ltd.
 - A start-up company in the field of Cloud Data, A.I., High Performance Computing (HPC), and other high-energy demand computing applications
 - Developed a new technology for high-performance computing that greatly reduces air handling and cooling costs
 - Proof-of-Concept is completed, and patent application is pending.

- **Expert Observer - Engineering** May 2015 – Dec. 2015
United Nation Framework Convention on Climate Change (UNFCCC)
World Federation of Engineers
 - Official Expert Observer for UNFCCC:
 - 21st Conference of the Parties (COP21) – Paris, France
 - Subsidiary Body for Implementation (SBI) – Bonn, Germany / Paris, France
 - Subsidiary Body for Scientific and Technological Advice (SBSTA) – Bonn, Germany / Paris, France
 - Provided expertise support on engineering topics to negotiating parties to assist in technologically suitable policies on adaptation and mitigation.

- **Production Technology Researcher** May 2009 – January 2011
Royal Dutch Shell (*In-Situ R&D - Projects & Technologies*)
 - Confidential projects in areas of metering, In-Situ heating, well completion, drilling, etc.
 - Extensive experience with computational (COMSOL, ProEngineer and Wolfram Mathematica) and analytical analysis of engineering problems
 - Investigated application of tomography processes in multiphase flow metering
 - Multiphysics simulations on electrode placement, voltage and heat distribution
 - CFD simulation using COMSOL and Analytical modeling of the new meter cooling design

- **Maintenance and Integrity Summer Intern** May 2008 – September 2008
Shell Canada Ltd. (*Exploration and Production*)
 - Project: Waterton Well-site Field and Gas Plant optimization during turn-around period
 - Reviewing P&ID's, MFD's, and UFD's with the physical instrumentations verified to be in use at site
 - Identifying the criticality of equipment (i.e. safety, environment, financial gain/loss, etc.)
 - Recognizing the behavior of fluids under extreme situations and their consequences
 - Learning the overall instrumentation and process techniques in engineering design along with the required safety measurements and modifications for recovery and processing of sour gas

AFFILIATIONS & OTHER MEMBERSHIPS

- Assoc. of Prof. Engineers & Geologists of Alberta – **Professional Engineer** 2018 – Present
- Canadian Society for Mechanical Engineering (CSME) 2020 – Present
- American Physical Society (APS) 2014 – Present
- Assoc. of Prof. Engineers & Geologists of Alberta – Engineer-in-Training 2011 – 2018
- Director of the Univ. of Calgary Aero-Energy Seminar Series 2012 – 2016
- Founding President of the Mech. Engineering Grad. Students Association 2012 – 2013
- Head of Engineering Books for Africa Initiative (*book donation for Ethiopian*) 2012 – 2013

- American Society of Mechanical Engineers (ASME) 2008 - 2011

HIGHLIGHTED CONFERENCE PARTICIPATION & INVITES

- World Congress on Computational Mechanics (WCCM) 2020 – Present
- CSME Congress – Sym. of Fluid Mechanics 2020 - Present
- European Fluid Mechanics Conference (EFMC) 2018 – Present
- International Symposium on Turbulence & Shear Flow Phenomenon (TSFP) 2015 – Present
- Annual Meeting of American Physical Society (APS) Division of Fluids (DFD) 2014 – Present
- iTi Conference on Turbulence 2014 – Present
- International Union of Theoretical & Applied Mechanics (IUTAM): Vortex Dynamics 2017 – Present
- Okanogan Fluid Mechanics Conf. / Rocky Mountain Fluid Mech. Conf. 2017 – Present
- United Nations' 21st Conference of Parties (COP21) – Paris Climate Agreement December 2015
- UNFCCC Subsidiary Body for Implementation 2015
- UNFCCC Subsidiary Body for Scientific and Technological Advice 2015
- World Energy Engineering Congress 2014

PUBLICATIONS

Note that * identify Highly Qualified Personal (HQP) under my supervision.

JOURNAL PUBLICATIONS

(Major Papers to be submitted soon)

77. *Verma, S., Hemmati, A. (2023) Source of leading-edge vortex instability and its mechanism in the wake of oscillating foils related to fish swimming, *Physical Review Letters* (To be submitted: Dec 2023)
76. *Marshall, G., Lin, R., Hemmati, A. (2023) The implications of multiple fuels in accurate modeling of wildfire using FIRETEC, *Int. J. of Wildland Fire*. (To be submitted: Dec. 2023 – Delayed due to summer fire season)

(Papers Under Review / Revisions Requested)

75. *Verma, S., Hemmati, A. (2023) Characterizing the mechanisms of spanwise vortex instabilities in a broad parameter space for biological species. *J. Fluid Mechanics*. (Under Review - Nov 2023)
74. *Gungor, A., *Verma, S., Hemmati, A. (2023) Ground effect shear layer instability for oscillating foils, *J. Fluid Mechanics*. (Under Review – pp. 5)
73. *Khalid, M.S.U, Dong, H., Hemmati, A. (2023) A review of numerical studies on fish schools: hydrodynamics, performance and wake dynamics, *Bioinsp. Biomim.* [Invited Paper] (Under Review – pp. 55)
72. *Salam, N., Tarokh, A., Hemmati, A. (2023) Lowering heat losses and drag in transporting geothermal water using new subsurface casings with targeted wall-shapes. *Applied Thermal Engineering*. (Under Review – pp. 15)

71. *Chitgar, N., Karami, P., Hemmati, A., Sadrzadeh, M. (2023) A multi-carrier energy system for electricity, desalinated water, and hydrogen production: conceptual design and techno-economic optimization. *Renewable Energy*. (Under Review – pp. 44)
70. *Gungor, A., Khalid, M.S.U., Hemmati, A. (2023) A comprehensive physics-based scaling of oscillating foils in schooling configuration, *Proc. Royal Society Interface*. (Revisions Req. – pp. 23)

(Papers Accepted & Published)

69. Khalid, M.S.U., *Portocarrero Mendoza, P., Wood, D.H., Hemmati, A. (2023) On the Aerodynamics of Dual-Stage Co-Axial Vertical-Axis Wind Turbines. *Wind Engineering*. (Accepted – pp. 30)
68. *Moradi, K., Rastgar, M., Karami, P., Tousefi, A., Noamani, S., Hemmati, A., Sadrzadeh, M. (2023) Performance Analysis of the Thermo Osmotic Energy Conversion (TOEC) Process for Harvesting Low-Grade Heat. *Chemical Engineering Journal Advances*. (In Press – pp. 30)
67. *Goswami, S., Hemmati, A. (2023) Mean wake transition mechanisms behind long wall-mounted prisms. *J. Int. Heat & Fluid Flow*. (In Press – pp. 25)
66. *Freeman, B., Martinuzzi, R., Hemmati, A. (2023) A new flow modeling technique based on Fourier-Averaged-Navier-Stokes, *J. Fluid Mechanics*. (In Press – pp. 25)
65. Forooq, H., Khalid, M.S.U., Akhtar, I., Hemmati, A. (2023) Comparative performance of nonlinear energy harvesters through strongly coupled fluid-structure-electrical interactive models. *J. Fluids and Structures*.
64. Rastgar, M., *Moradi, K., Burroughs, C., Hemmati, A., Hoek, E., Sadrzadeh, M. (2023) Harvesting Blue Energy Based on Salinity and Temperature Gradient: Challenges, Solutions, and Opportunities. *Chemical Reviews*.
63. *Verma, S., Hemmati, A. (2023) Mechanism of transition to dual vortex streets in the wake of oscillating foil, *Proceedings of Royal Society A*. 479 (2276), pp. 20230353.
62. Forooq, H., *Khalid, M.S.U., Akhtar, I., Hemmati, A. (2023) Energy Harvesting from Nonlinear Vortex-Induced Vibrations of Cylinders and Flutter of Airfoils. *Applied Energy*.
61. *Freeman, B., Martinuzzi, R., Hemmati, A. (2023) The effect of spanwise instability on low-frequency signature of the wake behind normal flat plate, *Int. J. Heat & Fluid Flow*. 03, pp. 109176. [Invited Paper]
60. *Verma, S., Hemmati, A. (2023) Implications of spanwise wake instability on the formation of secondary structures behind oscillating foils, *Int. J. Heat & Fluid Flow*, 102, pp. 109146. [Invited Paper]
59. *Chitgar, N., Hemmati, A., Sadrzadeh, M. (2023) A comparative performance analysis, working fluid selection, and machine learning optimization of three ORC systems driven by geothermal energy for fresh water and electricity productions. *Energy Conversion and Management*, 286, pp. 117072.
58. *Marshal, G., Lin, R., Hemmati, A. (2023) A new sub-scale closure model for fuel reactions in forest fire simulations, *Journal of Environmental Modeling & Software*. 164, pp. 164.
57. *Goswami, S., Hemmati, A. (2023) Transition in the mean wake topology of large depth-ratio prisms at low to moderate Reynolds numbers. *J. Fluid Mech*. 950, pp. A31.
56. Forooq, H., *Khalid, M.S.U., Akhtar, I., Hemmati, A. (2022) Non-linear dynamics modeling of undulating and flapping foils. *Journal of Ocean Engineering*.
55. *Zargar, A., *Goswami, S., Hemmati, A. (2022) The wake topology behind a finite aspect ratio long-cylinder at a normal incident angle. *J. Wind Eng. & Industrial Aerodynamics*.

54. *Verma, S., *Khalid, M.S.U, Hemmati, A. (2022) Implications of coupled motion kinematics on lift variations for oscillating foils. *Journal of Micro-Aerial Vehicles*.
53. *Gungor, A., *Khalid, M.S.U, Hemmati, A. (2021) Classification of vortex patterns of oscillating foils in side-by-side configurations, *J. Fluid Mechanics*.
52. *Verma, S., Hemmati, A. (2021) Characterization of bifurcated dipole vortex streets in the wake of an oscillating foil, *Journal of Fluid Mechanics*.
51. *Goswami, S., Hemmati, A. (2021) The mechanism of unsteady wake transition behind wall-mounted rectangular prisms of different depth-ratios at low Reynolds numbers. *J. Fluid Mech.*
50. Asim, T, Islam, S.Z., Hemmati, A., Khalid, M.S.U (2021) A review of recent advancements in offshore wind turbines technology. *Energies*. [Invited Paper]
49. *Khalid, M.S.U, Wood, D.H., Hemmati, A. (2021) Self-starting characteristics and flow-induced rotation of multi-stage co-axial vertical-axis wind turbines. *Energies*.
48. *Verma, S., Hemmati, A. (2021) Transition in the wake of oscillating foils with combined heaving and pitching motion, *Physical Review E*.
47. *Verma, S., *Freeman, B., Hemmati, A. (2021) On the performance scaling of oscillating foils with combined heaving and pitching motions, *Physics of Fluids*.
46. *Khalid, M.S.U, Wood, D.H., Hemmati, A. (2021) Bioinspiration in development of a multi-stage vertical wind turbine enhances energy extraction at lower tip ratios. *Energy*.
45. *Mohammadtabar, A., Nazaripoor, A., Sadrzadeh, M., Hemmati, A. (2021) Thermocapillary patterning of non-Newtonian thin films. *Physics of Fluids*.
44. *Zargar, A., *Tarokh, A., Hemmati, A. (2021) Evolution of unsteady wake structures in the wake of large depth-to-height ratio cylinders at low Reynolds numbers. *J. Fluid Mechanics*.
43. *Masoumifar, M., *Verma, S., Hemmati, A. (2021) The recovery of turbulent pipeflow dynamics depend on the targeted wall geometries at high Reynolds number. *Int. J. Heat & Fluid Flow*. 92, 108882.
42. *Masoumifar, M., *Verma, S., Hemmati, A. (2021) Performance of Turbulence models in modeling pipe flow with small perturbations at a range of Reynolds numbers. *ASME Journal of Fluid Engineering*. <https://doi.org/10.1115/1.4052674>.
41. *Verma, S., Hemmati, A. (2021) Evolution of wake structures in the wake of oscillating hydrofoils, *J. Fluid Mechanics*. 927, A23, pp. 1-47.
40. *Goswami, S., Hemmati, A. (2021) Response and recovery of viscoelastic pipeflow over a square bar roughness at moderate Reynolds numbers. *Computations*. 9(8) pp. 85.
39. *Gungor, A., *Khalid, M.S.U, Hemmati, A. (2021) How are the wake dynamics altered by abrupt changes to the oscillation phase angle? *Phys. of Fluids*. 33, pp. 081901.
38. *Khalid, M.S.U, Wang, J., Akhtar, I., Dong, H., Liu, M., Hemmati, A. (2021) Larger wavelengths suit the hydrodynamics of carangiform swimmers, *Phys. Rev. Fluids*. 6, pp. 073101. [Editor's Suggestion]
37. *Zargar, A., *Tarokh, A., Hemmati, A. (2021) The wake topology of a wall-mounted long cylinder at low Reynolds numbers. *Energies*. 14, pp. 3579.
36. *Gungor, A., Hemmati, A. (2021) The scaling of propulsive performance of tandem pitching foils in side-by-side configuration. *J. Fluids & Structures*. 104, pp. 103320.
35. *Masoumifar, M., *Verma, S., Hemmati, A. (2021) Response of turbulent pipeflow to targeted wall geometries at a range of Reynolds numbers. *Physics of Fluids*. 33, 065105.

34. *Khalid, M.S.U, Wang, J., Akhtar, I., Dong, H., Liu, M., Hemmati, A. (2021) Why do anguilliform swimmers perform undulation with wavelengths shorter than their bodylengths? *Physics of Fluids*, 33, pp. 031911. [Editor's Pick]
33. *Mohammadtabar, A., Nazariipoor, A., Riad, A., Sadrzadeh, M., Hemmati, A. (2021) Dynamics of Thermocapillary Induced Patterning of Thin Liquid Films. *AIP Advances*. 11 (4), pp. 045337.
32. *Jia, Y., Noga, M., Punithkumar, K., Hemmati, A. (2021). Implications of outlet boundary condition on simulating blood flow in a pediatric healthy aorta. *Theoretical & Computational Fluid Dynamics*. 35, pp. 419 – 436.
31. *Gungor, A., Hemmati, A. (2021) Implications of changing synchronization in propulsive performance of tandem pitching foils. *Bioinspiration and Biomimetics*. 16, pp. 036006
30. *Zargar, A., *Gungor, A., *Tarokh, A., Hemmati, A. (2021) Coherent structures in the wake of a long wall-mounted rectangular cylinder at large incident angles. *Physical Review Fluids*. 6 (3), pp. 034603. [Nominated for François Frenkiel Award in Fluid Mechanics]
29. *Goswami, S., Hemmati, A. (2021) Evolution of turbulent pipeflow recovery over a square bar roughness element over a range of Reynolds numbers. *Physics of Fluids*. 33 (3), pp. 035113.
28. Karimi, S., *Zargar, A., Mani, M., Hemmati, A. (2020). The effect of single dielectric barrier discharge actuators in controlling flow over an Ahmed body. *Fluids*. 5 (4), pp. 244.
27. *Jia, Y., Noga, M., Punithkumar, K., Hemmati, A. (2020). Evaluation of blood flow structures in the presence of wall defects in unhealthy aorta of children. *ASME J. Applied Mechanics*. 88, pp. 021001.
26. *Gungor, A., Hemmati, A. (2020) The wake symmetry behind tandem side-by-side foils. *Physical Review E*. 102, pp. 043103.
25. *Tarokh, A., Bliss, C., Hemmati, A. (2020) Performance Enhancement of a Two-Phase Closed Thermosiphon with a Vortex Generating Obstacle. *Applied Thermal Eng.* (132), pp. 116032.
24. *Goswami, S., Hemmati, A. (2020) The effect of multiple square roughness elements on recovery of turbulent pipeflow at high Reynolds number. *Physics of Fluid*. (32), pp. 075110
23. *Verma, S., Hemmati, A. (2020) Performance of Overset Mesh in Modelling Generic Wakes of sharp-edge bodies. *Computations*. 8(3), pp. 66.
22. Simsek, E., *Freeman, B., Senturk, U., Hemmati, A. (2020) Implications of reduced frequency on wake structure of tandem in-line foils. *AIAA Journal*. 58 (11), pp. 4620-4628.
21. *Mohammadtabar, A., Nazariipoor, A., Riad, A., Sadrzadeh, M., Hemmati, A. (2019). A Numerical Study for Thermocapillary Induced Patterning of Thin Liquid Films. *Physics of Fluids*. 32, pp. 024106.
20. Fogaing, M.B., Hemmati, A., Lange, C., Fleck, B.A. (2019) Performance of turbulence models in simulating wind loads on PV modules. *Energies*. 12 (17), pp. 3290.
19. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2019) Wake dynamics and surface pressure variations on two-dimensional normal flat plates. *AIP Advances*. 9 (4), pp. 04529. [Editor's Pick]
18. Hemmati, A., Smits, A.J. (2019) Effect of pitching frequency on propulsive performance of oscillating foils. *ASME J. Appl Mechanics*. 86 (10), pp. 101010.
17. Hemmati, A., Smits, A.J. (2019) Reynolds number effects on the wake structures of panels of low aspect ratio. *AIAA Journal*. 58(3), pp. 1397-1401.
16. Hemmati, A., Van Buren, T., Smits, A.J. (2019) Effect of trailing edge surface pressure fluctuations on thrust generation for underwater locomotion. *Physical Review Fluids*. 4 (3), pp. 033101.
15. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2018) On simulating the flow past a normal thin flat plate. *J. Wind Engineering & Industrial Aerodynamics*. 174, pp. 170-187.

14. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2016) Characteristics of distinct wake regimes in the wake of an infinitely span normal thin flat plate. *Int. J. Heat & Fluid Flow*. 62, pp. 423-436.
13. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2016) Effect of side-edge vortices and secondary induced flow on the wake of normal thin flat plates. *Int. J. Heat & Fluid Flow*. 61, pp. 197-212.
12. Singh, K., Hemmati, A., Wood, D.H. (2012) The Aerodynamic characterization of generic tail fin shapes. *Wind Engineering*. 36 (5), pp. 493-507.

Refereed Conference Full-Papers

11. *Verma, S., Hemmati, A. (2023) Origins of dual hairpin-horseshoe vortex arrangement in the wake of oscillating foils, *Progress in Turbulence*. X. (Accepted – pp. 23)
10. *Zargar, A., Hemmati, A. (2021) The secondary instability in the oblique wake of a large-depth-ratio prism. *Progress in Turbulence*. IX, pp. 46-51. Springer.
9. *Verma, S., Hemmati, A. (2021) Three-dimensional instability in the wake of oscillating foils with combined heaving and pitching. *Progress in Turbulence*. IX, pp. 33-38. Springer.
8. *Jia, Y., Atkien, C., Punithkumar, K., Noga, M., Hemmati, A. (2019). Bloodflow Structures in Healthy and Unhealthy Aorta. *Proceedings of the 11th International Symposium on Turbulence and Shear Flow Phenomenon*. pp. 1 – 6.
7. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2017) Evolution of Vortex Formation in the Wake of Thin Flat Plates with Different Aspect-Ratios, *Progress in Turbulence*. VII, pp. 164-170. Springer.
6. Hemmati A., Wood D.H., Martinuzzi R.J. (2017) Evolution of Vortex Formation in the Wake of Thin Flat Plates with Different Aspect-Ratios. *Progress in Turbulence*. VII, pp. 196 – 202.
5. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2017) Effect of wake structures on surface pressure fluctuations on a normal thin flat plate, *Proceedings of the 10th International Symposium on Turbulence and Shear Flow Phenomenon*. pp. 1 – 6.
4. Hemmati, A., Senturk, U., Smits, A.J. (2017) Benchmark results for a new Immersed Boundary Layer method. *Proceedings of the 10th International Symposium on Turbulence and Shear Flow Phenomenon*.
3. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2016) Wake dynamics behind a normal thin flat plate at moderate Reynolds numbers, *Progress in Turbulence*. V, pp. 165-170. Springer.
2. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2015) Direct numerical simulation of the wake of a normal thin flat plate: infinite vs. finite width, *Proceedings of the 9th International Symposium on Turbulence and Shear Flow Phenomenon*. pp. 1 – 6.
1. Ortiz, X., Hemmati, A., Rival, D., Wood, D.H. (2012) Instantaneous forces and moments on inclined flat plate. *Bluff Body Aerodynamics and Applications*. pp. 1 – 10.

CONFERENCE PROCEEDINGS

45. *Aitken, C., *Verma, S., Hemmati, A. (2023) On manipulating blood flow in major arteries with geometrical anomalies. *Bulletin of the American Physical Society*. Washington, DC.
44. Khalid, M.S., *Gungor, A., Hemmati, A. (2023) How does ground effect impact the formation of 3D instabilities in the wake of parallel oscillating foils. *Bulletin of the American Physical Society*. Washington, DC.
43. *Gungor, A., Khalid, M.S., Hemmati, A. (2023) Physics-based scaling laws for collective swimmers. *Bulletin of the American Physical Society*. Washington, DC.
42. *Goswami, S., Hemmati, A. (2023) The mechanism of unsteady wake transition behind large depth-ratio wall-mounted prisms. *Bulletin of the American Physical Society*. Washington, DC.

41. *Verma, S., Hemmati, A. (2023) On the origins of dual hairpin vortex arrangement in the wake of oscillating foils. *iTi Conference on Turbulence*. Italy.
40. *Gungor, A., Khalid, M.S., Hemmati, A. (2022) Implications of three-dimensionality in the wake of parallel oscillating foils. *Bulletin of the American Physical Society*. Indianapolis, IN.
39. *Verma, S., Hemmati, A. (2022) Single- and two-way coupled overset interpolations to model fluid-structure interactions of oscillating foils in OpenFOAM. *Bulletin of the American Phys. Society*. Indianapolis, IN.
38. *Goswami, S., Hemmati, A. (2022) Mean wake transition of wall -mounter long prisms at low Reynolds numbers. *Bulletin of the American Physical Society*. Indianapolis, IN.
37. *Shojaee, S.A., Lange, C.F., Hemmati, A. (2022) A data-driven neural-network algorithm for predicting the wake of buildings using RANS and LES. *European Fluid. Mech. Conf.* Athens, Greece.
36. *Goswami, S., Hemmati, A. (2022) Secondary structures in the axisymmetric wake behind of low aspect-ratio wall-mounted prisms. *European Fluid. Mech. Conf.* Athens, Greece.
35. *Gungor, A., Hemmati, A. (2021) The hydrodynamics of parallel foils: the path to enhanced performance for micro-swimmers. *ECCOMAS 2022: Mini-Symposium on Low Reynolds number flows: from microswimmers to microdrones*. Oslo, Norway. [Invited Submission]
34. *Verma, S., Hemmati, A. (2021) Implications of spanwise wake instability on formation of secondary structures behind oscillating foils. *12th Int. Symposium on Turbulence and Shear Flow Phenomena*. Osaka, Japan.
33. *Freeman, B., Hemmati, A. (2021) Fourier-averaged Navier-Stokes analysis of periodic wakes: a new technique. *12th Int. Symposium on Turbulence and Shear Flow Phenomena*. Osaka, Japan.
32. *Verma, S., Hemmati, A. (2021) On wake mode transition of a foil with combined heaving and pitching motion. *Bulletin of the American Phys. Society*. Phoenix, AR.
31. *Freeman, B., Hemmati, A. (2021) The idea of Fourier-Averaged-Navier-Stokes formulations for turbulent flow modeling. *Bulletin of the American Physical Society*. Phoenix, AR.
30. *Gungor, A., Khalid, M.S., Hemmati, A. (2021) The physical mechanism behind the wake merging phenomena of pitching foils in side-by-side arrangement. *Bulletin of the American Physical Society*. Phoenix, AR.
29. *Verma, S., Hemmati, A. (2020) Three-dimensional unsteady wake dynamics of hydrofoils with combined pitching and heaving motions. *Bulletin of the American Phys. Society*. Chicago, IL. (COVID-19: Virtual)
28. *Freeman, B., *Verma, S., Hemmati, A. (2020) Scaling the performance of hydrofoils with combined pitching and heaving motion in underwater swimming. *Bulletin of the American Physical Society*. Chicago, IL. (COVID-19: Virtual)
27. *Zargar, A., Hemmati, A. (2020) Coherent structures in the wake of a large depth-ratio wall-mounted rectangular cylinder at high incidence angles. *Bulletin of the American Physical Society*. Chicago, IL. (COVID-19: Virtual)
26. *Maroumfar, M., *Verma, S., Hemmati, A. (2020) The Response of Modified Turbulent Pipe-Flow Targeting Distinct Fourier Modes at a Range of Reynolds Numbers. *Bulletin of the American Physical Society*. Chicago, IL. (COVID-19: Virtual)
24. *Marshall, G., Linn, R., Thompson, D., Josephson, A., Hemmati, A. (2020) Contrasting fuel mixtue integration methods in wildfire behavior modelling using FIRETEC. *Bulletin of the American Physical Society*. Chicago, IL. (COVID-19: Virtual)
23. *Gungor, A., Hemmati, A. (2020) Transition in the wake symmetry of tandem side-by-side oscillating foils. *Bulletin of the American Physical Society*. Chicago, IL. (COVID-19: Virtual)

22. *Goswami, S., Hemmati, A. (2020) Benchmark Study of RANS Turbulence Modeling of Pipeflow Past Square Bar Roughness. *14th World Congress in Computational Mechanics (WCCM) – ECCOMAS Congress 2020*. Paris, France. (COVID-19: Postponed)
21. *Zargar, A., Hemmati, A. (2020) The wake topology of wall-mounted long rectangular cylinders. *iTi Conference on Turbulence*. Italy. (COVID-19: Postponed)
20. *Verma, S., Hemmati, A. (2020) Asymmetry in the wake of oscillating foils with combined heaving and pitching motion. *iTi Conference on Turbulence*. Italy. (COVID-19: Postponed)
19. *Gungor, A., Hemmati, A. (2020) The wake topology and performance of tandem foils in swimming. *European Fluid Mechanics Conference*. Zurich, Switzerland. (COVID-19: Postponed)
18. *Verma, S., Hemmati, A. (2020) Secondary spanwise structures in the wake of oscillating foils. *European Fluid Mechanics Conference*. Zurich, Switzerland. (COVID-19: Postponed)
17. *Zargar, A., Hemmati, A. (2020) The unsteady wake of large depth-ratio rectangular cylinders at low Reynolds numbers. *European Fluid Mechanics Conference*. Zurich, Switzerland. (COVID-19: Postponed)
16. *Gungor, A., Hemmati, A. (2019) The propulsive performance of side-by-side foils at a range of Reynolds number and Strouhal number. *Bulletin of the American Phys. Society*. Seattle, WA.
15. *Verma, S., Hemmati, A. (2019) Performance of Overset Mesh in modelling generic wakes for underwater swimming. *Bulletin of the American Physical Society*. Seattle, WA.
14. *Gungor, A., Hemmati, A. (2019) Can we use the fish swimming habits to harvest energy in rivers? *Future Energy Symposium*, Edmonton, AB.
13. *Verma, S., Hemmati, A. (2019) Micro-scale underwater energy harvesting. *Future Energy Symposium*, Edmonton, AB.
12. *Tarokh A, Hemmati A. (2019). Implications of the trailing edge on swimming performance of heaving panels. *11th International Symposium on Turbulence and Shear Flow Phenomenon (TSFP11)*, Southnampton, UK.
11. *Jia, Y., Atkien, C., Punithkumar, K., Noga, M., Hemmati, A. (2019). The Implications of Flow Structures in Blood Flow in Healthy and Unhealthy Aorta. *11th International Symposium on Turbulence and Shear Flow Phenomenon (TSFP11)*, Southnampton, UK.
10. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2017) Effect of wake structures on surface pressure fluctuations on a normal thin flat plate, *10th International Symposium on Turbulence and Shear Flow Phenomenon (TSFP9)*, Chicago, USA.
9. Hemmati, A, Senturk, U., Smits, A.J. (2017) Benchmark results for a new Immersed Boundary Layer method. *10th International Symposium on Turbulence and Shear Flow Phenomenon (TSFP9)*, Chicago.
8. Hemmati, A., Wood, D.H., Martinuzzi, R.J., Ferrari, S., Hu, J. (2017) Vortex identification by local normalization of velocity gradients. *IUTAM: Vortex Dynamics*, France.
7. Senturk, Utku, Hemmati, A., Smits, A.J. (2016) Performance of an open-source, sharp interface immersed boundary method in simulating the flow past rigid bodies. *Bulletin of the American Physical Society*. Portland, OR.
6. Hemmati, A., Martinuzzi, R.J., Wood, D.H. (2016) The implications of regions of spin and splat contributions to pressure fluctuations in the wake of normal flat plates. *Bulletin of the American Physical Society*. Portland, OR.
5. Hemmati, A., Martinuzzi, R.J., Wood, D.H. (2016) Effect of aspect-ratio on evolution of wake structures: from rectangular to square normal flat plates. *2016 iTi Conference on Turbulence*, Italy.c

4. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2015) Direct numerical simulation of the wake of a normal thin flat plate: infinite vs. finite width, 9th *International Symposium on Turbulence and Shear Flow Phenomenon (TSFP9)*, Melbourne, Australia.
3. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2015) Momentum transport in the wake of a finite-length thin flat plate. *Bulletin of the American Physical Society*. Boston, MA.
2. Hemmati, A., Wood, D.H., Martinuzzi, R.J. (2014) Comparing wake structures behind a finite aspect ratio and an infinite span normal thin flat plate. *Bulletin of the American Physical Society*. San Francisco.
1. Hemmati, A., Martinuzzi, R.J., Wood, D.H. (2013) Experiences in modeling wind loading on PV modules and solar collectors. In proceedings of *COMPdyn: Wind Effects on Structures*. Greece.

INVITED TALK

1. Hemmati, A. (2021) Emissions Reduction in the Energy Industry, *Association of Professional Engineers and Geologists of Alberta (APEGA) Professional Development Seminars*. (COVID-19: Virtual)
2. Hemmati, A. (2020) Climate Change: Science and Policy, *2020 TEDx UAlberta*, Edmonton, AB.
3. Hemmati, A. (2019) Emissions Reduction in Energy Extraction, Transportation and Consumption, *APEGA Annual General Meeting*, Calgary, AB.
4. Hemmati, A. (2019) Engineering and Innovation in Climate Change Mitigation, *Center for Global Education – Secondary Outreach Program*, AB.
5. Hemmati, A., du Plessix, P., Martinuzzi, R.J., Wood, D.H. (2016) Using DNS Data to Validate Pressure-Velocity Statistics Determined from Stereo-PIV Measurements. In Proceedings of *11th International ERCOFTAC Symposium on Engineering Turbulence Modeling and Measurements*, Italy.

MEDIA

1. Interview: Canadian Association of Petroleum Producers – Pipeline Technology (2019/09)
2. Interview: Friction is drag – New Trail (2019/04)
3. Interview: Pipes have teeth – FES Newsletter (2019/05)
4. Interview: Vue Magazine – Energy Sustainability in Alberta (2018/11)

OTHERs

1. Giuliani, V., Hemmati, A., Harris, C. (2010) Joule heating electrode simulation - surface electrical potential difference. *Royal Dutch Shell – Projects and Technologies*, Houston, TX.
2. Hemmati, A., Giuliani, V., Harris, C. (2010) Enclosure cooling by air natural convection. *Royal Dutch Shell. Royal Dutch Shell – Projects and Technologies*, Calgary, AB.
3. Hemmati, A., Giuliani, V., Harris, C. (2010) Multiphase flow metering for Canada heavy oil. *Royal Dutch Shell – Exploration & Production*, Calgary, AB.
4. Hemmati, A., Harris, C. (2009) The idea of neutron detection in multiphase flow metering. *Royal Dutch Shell – Exploration & Production*, Calgary, AB.

SERVICE

Institutional*University of Alberta*

- | | |
|---|----------------|
| 1. Chair: University Appeal Board | 2021 – Present |
| 2. Faculty Advisor: Undergraduate Rocketry Competition Team – STARR | 2018 – Present |
| 3. Dept. of Mechanical Engineering Nomination Committee | 2019 – Present |
| 4. Co-Chair: Future Energy System Research Advisory Council | 2018 – 2020 |
| 5. Dept. of Mechanical Engineering Graduate Programing Committee | 2018 – 2020 |
| 6. Mechanical Engineering Promotional Video | 2019 |
| 7. Faculty Mentorship Program | 2019 |
| 8. FGSR Alberta Innovate Scholarship Committee | 2018 & 2019 |
| 9. FGSR Scholarship Selection Committee | 2018 |
| 10. University 3M Thesis – Judge | 2018 |
| 11. Future Engineering System Symposium – Judge | 2018 |

University of Calgary

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|---|-------------|
| 12. Schulich School of Engineering Safety Improvement Committee | 2015 – 2016 |
| 13. Schulich School of Engineering Diversity & Equity Committee | 2015 – 2016 |
| 14. Chair: Mechanical Engineering Graduate Research Conference | 2012 – 2014 |

External

- | | |
|---|----------------|
| 1. 2022 CSME Congress – Conference Executive Committee | 2021 – Present |
| 2. Co-Chair of CSME Congress – Fluid Mechanics Symposium | 2020 – Present |
| 3. Technical Advisory Board: CSME Biomechanics | 2019 – Present |
| 4. Evaluation Committee: Ontario Research Fund Engineering Panel | 2019 |
| 5. Session Chair: TSFP | 2017, 2019 |
| 6. Session Chair: American Physical Society (APS) Annual Meetings | 2018, 2019 |
| 7. UN Framework Convention on Climate Change (UNFCCC) | |
| - Technical Observer: Subsidiary Body for Implementation | 2015 |
| - Technical Observer: Subsidiary Body for Scientific & Techn. Advice | 2015 |
| - Technical Observer: 21 st Conference of Parties [Paris Climate Accord] | 2015 |

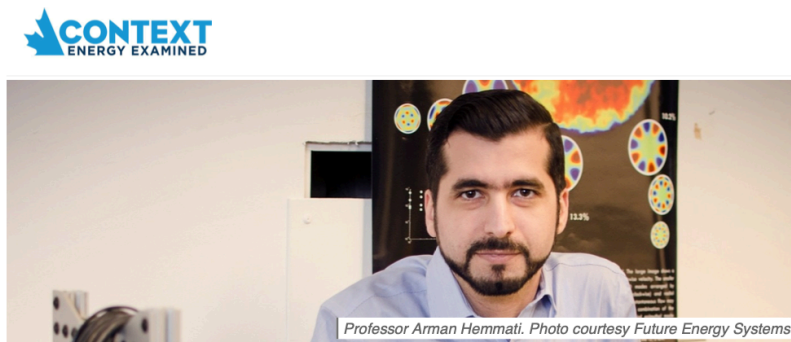
NON-TECHNICAL PUBLICATIONS & RECOGNITIONS

These are the list of non-technical publications and public recognitions of my research activities:

1. Tweet from Premier of Alberta (Governor of Alberta)



2. Article on Canadian Association of Petroleum Producers (CAPP): [enclosed]



Making oil sands pipelines operate more sustainably

UofA researcher Arman Hemmati is working on an enhanced pipeline design that could make bitumen-carrying pipelines more efficient.

By David Coglion Oct 7, 2020

3. TEDx Talk:

Finding common ground on climate change

Future Energy Systems Principal Investigator Arman Hemmati talks about the facts of Climate Change during TEDx UAlberta
Kenneth Tam, Catherine Tays - 27 July 2020



4. APEGA Professional Development Webinar/Seminar:

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#APEGAPD

Emissions Reduction in Energy Extraction, Transportation, and Consumption
Arman Hemmati, Ph.D., P.Eng.
Webinar | 10:00 a.m. - 12:00 p.m. | July 18, 2021

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apega.ca/events

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