Dr. Ahmed **Bakkar**

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Profile

- Postdoctoral researcher with **7+ years** of experience in **Computational Fluid Dynamics (CFD)** for **aerospace** applications.
- Comprehensive knowledge of the **Finite-Element method** and modelling **multi-phase flows**.
- Knowledgeable in **Finite-Volume** and **Finite-Difference** methods.
- Experience working in **HVAC** systems design and in **renewable energy** research.
- **Committed**, **team player**, **detail oriented**, and **flexible.**
- Demonstrated **research**, **leadership**, and **management** skills.

Skills

Multi-phase Flows	●●●●○	FORTRAN	●●●●●
FEM, XFEM	●●●●●	Python, C, C++	●●●○○
FVM, FDM	●●●○○	English, Arabic	●●●●●
MPI, Parallel Programing	●●●●○	French (conv)	●●●○○

Timeline

01. 2018 – Current — **Postdoctoral Research Fellow**
CFD Lab, McGill University
Montréal, QC, Canada

- Develop research plans in collaboration with industry.
- Estimate research timelines and ensure delivery deadlines are met.
- Write grant applications and assist in managing research budget.
- Manage graduate students in the following research areas: **fluid-structure interaction** using **XFEM**, **smoothed particle hydrodynamics** for **droplet dynamics,** gappy **reduced order modelling** for **data reconstruction,** and **ice accretion** and **shedding** tools for **helicopters**.

09. 2011 – 02. 2018 — **Doctor of Philosophy** in **Mechanical Engineering**
McGill University
Montréal, QC, Canada

- Introduced a **novel** approach improving the conservation characteristics of the **Level-Set** method.
- Developed a general **multi-phase** numerical framework in **Fortran** using **MPI**.

Timeline
Cont'd

- Conducted a preliminary parametric study into **supercooled large droplet** impingement.
- Supervisors: Prof. **Wagdi Habashi**, and Dr. **Marco Fossati**
- Teaching Assistant for: **Thermodynamics I** (MECH 240), **Mechanical Laboratories I** (MECH 362), **Turbomachinery and Propulsion** (MECH 535) and **Finite-Element methods in Computational Fluid Dynamics** (MECH 661).

06. 2009 – **08. 2011**
Master of Science in **Mechanical Engineering**
Cairo University
Giza, Egypt

- Developed a numerical model for a novel **desalination** plant using the **Solar Chimney** in **MATLAB**.
- Conducted a feasibility study for the proposed plant.
- Supervisor: Prof. **Abdalla Hanafi**.
- Teaching Assistant for: **Powerplant Systems Design** and **Fundamentals of Heat Transfer.**

11. 2008 – **03. 2009**
Mechanical Design Engineer
WS Atkins
Sharjah, UAE

- Conducted a preliminary study into using natural ventilation for a **LEED** project.
- Reviewed and adjusted **thermal load (HAP)** calculations for **smoke clearance system**.
- Responded to **RFI**s from contractor.
- Performed detailed **thermal load (HAP) calculations** for the various projects.
- **Coordinated** design issues with the various **in-house departmental teams**.

09. 2007 – **10. 2008**
Junior Mechanical Design Engineer
Dar Al-Handasah
Giza, Egypt

- Participated in meetings with **client** and **in-house teams** to **negotiate designs issues**.
- Responsible for **hospital room pressurization** in accordance with building standards.
- Conducted **thermal load (HAP) calculations** and system designs for various projects.
- Reviewed **plumbing system design** and calculations for a residential project.

09. 2002 – **06. 2007**
Bachelor of Science in **Mechanical Engineering**
Cairo University
Giza, Egypt

- Graduated with **Honors**, ranked top 2%.

Journal Publications

- **A. Bakkar**, W.G. Habashi and M. Fossati, "A Multi-Scale Level-Set Approach for droplet dynamics", in preparation, target journal: Computers & Fluids

2018
- X. Cui, **A. Bakkar** and W.G. Habashi, "A Multiphase SPH Framework for Supercooled Large Droplets Dynamics", Int Journal of Numerical Methods for Heat & Fluid Flow, accepted.

2015
- **A. Bakkar**, W.G. Habashi, M. Fossati, and G.S. Baruzzi, "A hybrid Taylor–Galerkin variational multi-scale stabilization method for the level set equation". Computers & Fluids.

Refereed Conference Proceedings

2019
- D. Caraeni, **A. Bakkar** and W.G. Habashi, "An Extended Finite-Element Method for Modelling Fluid-Structure Interaction", AIAA SciTech, accepted.

2018
- X. Ciu, **A. Bakkar** and W.G. Habashi, "Multiphase SPH Modeling of Supercooled Large Droplets Dynamics", 13th SPHERIC International Workshop.
- A. Kaveh, W.G. Habashi and **A. Bakkar**, "Combining CFD, EFD and FFD data via Gappy Proper Orthogonal Decomposition", CFD Society of Canada.

2016
- **A. Bakkar**, W.G. Habashi, and M. Fossati, "Modeling of Large Droplets Impingement Using a Hybrid Taylor-Galerkin Variational Multi-Scale Stabilized Level Set Method", AIAA SciTech.

2013
- **A. Bakkar**, W.G. Habashi, and M. Fossati, "A Hybrid Taylor-Galerkin Variational Multi-Scale Stabilization Method for the Level Set Equation", CFD Society of Canada.

Honors and Awards

2011 **McGill Engineering International Tuition Award**

2013 **McGill University**

"Funding to attract high calibre international doctoral students to the Faculty of Engineering's PhD programs"- $8,000 per year for a maximum of 3 years.

2007 **Adel Barakat Graduation Project Award**

ASHRAE, Cairo Chapter

Awarded to the best graduation project in the area of Air-Conditioning between Cairo University, Ain Shams University and Alexandria University.

Extra-curricular Activities

2014 **VP Finance**

2015 **Graduate Association of Mechanical Engineering Students (GAMES)**

Mechanical Engineering Department, McGill University

- Managed the finances of the organization assuring that it was in good standing.
- Worked with various team members to organizing social events for graduate students.

Hobbies

Football (soccer), kickboxing, travelling and cooking.