Ahmed Bakkar, PhD

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Guelph, ON, Canada

in

Profile

- · Comprehensive knowledge of the Finite-Element Method (FEM) and multi-phase flow modelling.
- Experienced in applying CFD to complex engineering problems.
- Knowledgeable in the areas of Fluid Dynamics, Heat Transfer and Turbomachinery.

Current Position

CFD Scientist Feb 2019

RWDI ☑

Guelph, ON, Canada

- Conduct various numerical CFD simulations, in collaboration with other engineers and project managers, for specialized projects:
 - Assess the thermal impacts of the floating solar photovoltaic (PV) systems to be installed on Singapore's Tengeh and Upper Peirce reservoirs - Conjugate Heat Transfer
 - Evaluate sand mitigation strategies to be deployed along the Etihad rail network (UAE) Surface Shear
 - Assess Covid-19 related risks for dental clinics Contaminant dispersion
 - Conduct urban wind simulations for high-rise buildings LES/IDDES simulations
 - Conduct thermal comfort studies for various iconic projects RANS simulations
 - Simulate fire scenarios to determine egress times LES simulations
- Conduct R&D aimed at improving the existing tool repository:
 - Applied the canopy model for modelling porous media (trees and fences) within the openFOAM
 - Wrote a Python code for estimating droplet trajectory analytically while accounting for evaporation
- · Consult with clients on technical aspects of their projects, providing design guidance and recommendations.

Professional Experience

Postdoctoral Research Fellow

Jan 2018

Jan 2019

Montréal, QC, Canada

- Assisted in developing a 2-year research plan in collaboration with partners (Bell Helicopter ♥, NSERC ♥).
- · Estimated research timelines and established work plans to ensure delivery deadlines are met.
- Assisted in managing research budget (~600K CAD).
- · Co-supervise graduate students (Ph.D. and M.Sc.) in the following research areas: Fluid-Structure Interaction (FSI) using XFEM, Smoothed Particle Hydrodynamics (SPH) for droplets, gappy Reduced-Order Modelling (ROM) for data reconstruction, and Ice-Accretion and Shedding Tools for helicopters.

Mechanical Design Engineer WS Atkins ☑

Nov 2008

Mar 2009

Sharjah, UAE

- Investigated using natural ventilation instead of conventional AC systems for an eco-lodge (LEED).
- Reviewed and adjusted thermal load calculations for carpark smoke clearance system.
- Performed detailed thermal load calculations for the various projects.
- Coordinated design issues with the various in-house departmental teams.

Junior Mechanical Design Engineer Dar Al-Handasah ♂

Sep 2007

Oct 2008

Giza, Egypt

- Participated in meetings with client and in-house teams to deliberate over designs issues.
- Performed detailed hospital room pressurization in accordance with building standards.
- Designed under-floor HVAC system for international airport control tower.
- Conducted thermal load calculations and system designs for various projects.

Education

Doctor of Philosophy (Ph.D.) in Mechanical Engineering McGill University

Sep 2011

Feb 2018

Montréal, QC, Canada

- Thesis: "A Finite-Element Level-Set Eulerian Model of Supercooled Large Droplet Dynamics". 🗷
- Supervisors: Prof. Wagdi Habashi 🗷, and Dr. Marco Fossati. 🗹
- Introduced a novel approach improving the conservation characteristics of the Level-Set method.
- Developed a general multi-phase numerical framework in Fortran using MPI.
- Conducted a preliminary parametric study into supercooled large droplet impingement.
- Graduate courses: Advanced Fluid Mechanics, Applied Mathematics 1, Computational Aerodynamics, Finite-Element Methods in CFD, Turbomachinery and Propulsion.
- Teaching Assistant: Thermodynamics I, Mechanical Laboratories I, Turbomachinery and Propulsion and Finite-Element methods in CFD.

Master of Science (M.Sc.) in Mechanical Engineering Cairo University

Jun 2009

Aug 2011

Giza, Egypt

- Thesis: "Humidification-Dehumidification of Saline Water Using Solar Chimney".
- Supervisor: Prof. Abdalla Hanafi.
- Developed a numerical model for a novel desalination plant using the Solar Chimney in MATLAB.
- Conducted a feasibility study for the proposed plant.
- Graduate courses: Theory of fine Measurements, Computational Methods in Energy, Advanced Fluid Mechanics, Turbulent Flow, Heat Convection.
- Teaching Assistant: Powerplant Systems Design and Fundamentals of Heat Transfer.

Bachelor of Science (B.Sc., Honors) in Mechanical Engineering

Sep 2002

Cairo University

Jun 2007

Giza, Egypt

Skills

Coding: FORTRAN, C++, Python, MPI, MATLAB.

Libraries: PETSc, Metis, MUMPS, Library of Iterative Solvers (Lis).

Software: Star-CCM+, openFOAM, FDS, ICEM, Fluent, AutoCAD.

Awards

McGill Engineering International Tuition Award

Sep 2011

McGill University

Apr 2014

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

Adel Barakat Graduation Project Award

Jan 2007

ASHRAE, Cairo Chapter

Awarded to the best graduation project in the area of Air-Conditioning.