

Manmeet Bhabra

mbhabra@mit.edu | (857) 472-9210 | manmeetbhabra.github.io

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Master of Science in Mechanical Engineering

Sept. 2018 – Present

GPA: 5.0 / 5.0

- **Relevant Coursework:** Numerical Methods for PDEs, Numerical Methods for Stochastic Modeling and Inference, Learning Machines (Physics Informed Machine Learning), Numerical Fluid Mechanics, Risk Aware and Robust Nonlinear Planning, Statistical Learning Theory and Applications, Numerical Linear Algebra, Nonlinear Optimization

McGill University, Montreal, QC

Bachelor of Engineering in Honours Mechanical Engineering

Sept. 2014 – May 2018

GPA: 4.00 / 4.00

- **Honours Thesis:** Adjoint-Based Aerodynamic Shape Optimization for the Discontinuous Galerkin Approach.
 - **Honours Design Project:** Analysis, Design and Control of a Hybrid Rocket Propulsion System.
 - **Relevant Coursework:** Computational Aerodynamics, Mechanics of Composite Materials, Control Systems, Ordinary and Partial Differential Equations, Statistical Mechanics, Probability, Numerical Methods
-

WORK/RESEARCH EXPERIENCE

MIT - MSEAS Research Group, Cambridge, MA

Graduate Research Assistant — Advisor: Prof. Pierre F. J. Lermusiaux

Sept. 2018 – Present

- Developed PDE based schemes (based on optimal control theory) for energy-constrained, time optimal path planning and navigation of autonomous marine vehicles. Investigating reduced order models for efficiently handling realistic uncertain ocean environments.
- Developing algorithms and schemes that utilize the level set method for efficient stochastic acoustic ray propagation at high frequencies. Investigating methods to use sparse acoustic measurements to perform robust Bayesian inversion of uncertain environment properties (ex. the sound speed profile, acoustic source location, etc.). The work has resulted in one conference paper thus far.

McGill Computational Aerodynamics Group, Montreal, QC

Undergraduate Research Assistant — Advisor: Prof. Siva Nadarajah

May 2016 – Aug. 2018

- Investigated the Discontinuous Galerkin method (a numerical method for high accuracy simulation of fluid flow) and its use in adjoint-based aerodynamic shape optimization.
- Explored the NURBS Enhanced Finite Element Method and Isogeometric Analysis as approaches for efficient aerodynamic shape optimization.
- Resulting Conference Posters/Papers:
 - Bhabra, M. and Nadarajah, S., 2019. Aerodynamic Shape Optimization for the NURBS-Enhanced Discontinuous Galerkin Method. In *AIAA Aviation 2019 Forum* (p. 3197).
 - Bhabra, M. and Nadarajah, S., 2018, Adjoint-Based Aerodynamic Shape Optimization for the Discontinuous Galerkin Approach, Poster presented at: *26th Annual Conference of the Computational Fluid Dynamics Society of Canada*, Winnipeg, Canada, 10-12 June 2018.

Bombardier Aerospace - Advanced Aerodynamics Group, Montreal, QC

Software Engineer Intern

May 2017 – Aug. 2017

- Developed software for processing and visualizing aerodynamic data collected from wind tunnel tests. The application was developed using the Model-View-Controller architecture using Python.
 - Optimized a process in Bombardier's Full Aircraft Navier-Stokes Code (FANSC). Generated Python scripts for running test cases and presented results for a potential speed up of 25%.
-

PROJECTS/DESIGN TEAMS

Hybrid Rocket Propulsion Subteam

McGill Rocket Team, Montreal, QC

Aug. 2017 – June 2018

- Implemented a computational model of the hybrid propulsion system in Python that utilized the NASA CAE library. Coded a finite volume solver (written in C) for the quasi-1D Euler equations to model the flow through the nozzle.
 - Designed, tested (using CFD and FEA) and optimized the nozzle, piping, and pyrotechnic flow actuation devices for the propulsion system. Culminated in a successful static hot fire test where results were used to validate our models.
-

SKILLS

Programming: Python, C++, C, MATLAB, Java, FORTRAN, LaTeX

Operating Systems: Linux, macOS, Windows

Software/Packages: Tensorflow/Keras, CMake, Git, Gmsh, Paraview,

PETSc, Open MPI, SolidWorks, NX 10, CATIA V5

Languages: English, French, Punjabi

Interests: Soccer, Basketball, Skiing

SELECTED AWARDS

- Epp and Ain Sonin Fellowship, (MIT, 2018)
- FRQNT Scholarship for Master's Studies, (Quebec Government, 2018)
- British Association Medal, (McGill, 2018)
- The William U. Lee Memorial Scholarship, (McGill, 2015-2017)
- James McGill Scholarship, (McGill, 2014)