

# Philip Zwanenburg

philip.zwanenburg@mail.mcgill.ca | 514-825-8368

## EDUCATION

### MCGILL UNIVERSITY

#### PHD IN MECHANICAL ENGINEERING

Sept. 2014 - Present | Montreal, QC

GPA: 4.00 / 4.00

### MCGILL UNIVERSITY

#### BS IN MECHANICAL ENGINEERING

Sept. 2010 - May 2014 | Montreal, QC

GPA: 3.99 / 4.00

### DAWSON COLLEGE

#### DEC IN HEALTH SCIENCE (FIRST CHOICE)

Sept. 2008 - May 2010 | Montreal, QC

## LINKS

Github:// [PhilipZwanenburg](#)

LinkedIn:// [Philip Zwanenburg](#)

Google Scholar:// [Philip Zwanenburg](#)

## COURSEWORK

### GRADUATE

MATH Numerical Differential Equations  
Numerical Analysis 1

COMP Matrix Computations

MECH Computational Gasdynamics

### UNDERGRADUATE

MATH Linear Algebra and PDE's

MECH Numerical Methods in Mech Eng  
Thermodynamics 1 & 2  
Fluid Mechanics 1 & 2

## TEACHING

### ASSISTANTSHIP

Linear Algebra and PDE's (2x)

Intermediate Calculus

Applied Electronics and Instrumentation

## SKILLS

### PROGRAMMING

Over 5000 lines:

C •  $\text{\LaTeX}$  • MATLAB

Over 1000 lines:

Python • Fortran

### LANGUAGES

English • French

## EXPERIENCE/RESEARCH

### MCGILL UNIVERSITY | GRADUATE STUDENT - PHD FAST-TRACK

Sept. 2014 - Present | Montreal, QC

Goal: Investigation of modern numerical methods for computational fluid dynamics:

- Proved the general equivalence of the Energy Stable Flux Reconstruction and filtered Discontinuous Galerkin methods (see significant publications).
- Investigated several aspects relating to curved high-order geometry treatment (see significant publications).
- Wrote an open-source high-order unstructured compressible Navier-Stokes Discontinuous Galerkin solver (available on github).
- Currently investigating the discontinuous Petrov-Galerkin method.
- Additional competencies/interests: multiresolution, sum factorization, isogeometric analysis, entropy stability.

### MCGILL UNIVERSITY | STUDENT UNDERGRADUATE RESEARCHER

May 2013/2014 - August 2013/2014 | Montreal, QC

- Explored multiresolution in the context of the Flux Reconstruction scheme for finite element analysis.
- Led to an accepted AIAA Aviation 2015 conference paper (unpublished).

### MCGILL UNIVERSITY | STUDENT UNDERGRADUATE RESEARCHER

May 2012 - August 2012 | Montreal, QC

- Contributed to the development of novel magnetic timing valve functionality for paper-based diagnostics platforms allowing them to be more user-friendly and opening up the possibility of performing multi-step immunoassays.
  - Magnetic Timing Valves for Fluid Control in Paper-Based Microfluidics (Lab on a Chip 2013).

### UNIVERSITÉ DE MONTRÉAL | CHEMISTRY RESEARCH ASSISTANT

May 2011 - August 2011 | Montreal, QC

- Investigated nanodot morphology in ultrathin block copolymer monolayer films.
- Atomic-force microscopy images generated were used in a presentation:
  - Ultrathin Block Copolymer Films: Reinterpretation of Pressure-Induced Transition and Gold Patterning of Nanostrand Templates (95th Canadian Chemistry Conference and Exhibition 2012).

## AWARDS

2017	National	Alexander Graham Bell Canada Graduate Scholarship
2015	University	McGill Engineering Doctoral Award
2015	National	NSERC Postgraduate Scholarship
2015	University	Vadasz Doctoral Fellowship in Engineering
2014	National	Canada Graduate Scholarship - Master's Program
2014	Provincial	FQRNT Bourses de maîtrise en recherche
2014	University	Charles Michael Morssen Gold Medal
2014-2012	University	NSERC Undergraduate Student Research Award (3x)

## SIGNIFICANT PUBLICATIONS

- [1] Philip Zwanenburg and Siva Nadarajah. Equivalence between the Energy Stable Flux Reconstruction and Filtered Discontinuous Galerkin Schemes. *Journal of Computational Physics*, 306:343 – 369, 2016.
- [2] Philip Zwanenburg and Siva Nadarajah. On the Necessity of Superparametric Geometry Representation for Discontinuous Galerkin Methods on Domains with Curved Boundaries. May 2017.