

# Arshia Fazeli

📍 York, ON    ✉ arsh.fazeli@yahoo.com    ☎ +1 (647) 781 4875    in arshia-fazeli    🌐 arshia-fazeli

## Education

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### University of Waterloo

Sept 2021 – Sept 2026

*PhD in Chemical Engineering*

- GPA : 92.67/100
- **Coursework:** Theory and Application of Transport Phenomena, Applied Engineering Mathematics, Chemical Reactor Analysis, Computational Fluid Dynamics for Engineering Design, Multiphase Flows, Computational Fluid Dynamics, Consulting

### University College London

Sept 2018 – June 2021

*BEng in Chemical Engineering*

- First Class Honour - GPA: 4.0/4.0
- **Coursework:** Computational Modelling and Analysis, Reaction Engineering, Process Dynamics and Control, Particulate Systems and Separation Processes
- **Minors:** Programming, Manufacture of Regenerative Medicine Products

## Experience

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### Computational Multiphysics Researcher

Sept 2021 –

*University of Waterloo*

- Developed and validated a well-posed Euler-Euler model with enhanced physical fidelity for simulation of different types of dispersed multiphase flows.
- Developed discontinuous Galerkin method solvers for various multiphysics problems including simulation of dispersed multiphase flows.
- Numerical verification of the developed solvers using the method of manufactured solutions.

### Teacher Assistant

Sept 2021 –

*University of Waterloo*

- Teaching Assistant for courses related to transport phenomena, numerical methods for solving ODEs and PDEs, and computational methods.

### Research Associate

Aug 2020 – Dec 2020

*University College London*

- Conducting molecular dynamics simulations using LAMMPS and PLUMED to investigate nucleation pathways in colloidal suspensions.

## Projects

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### DG-based solvers for multiphysics problems

- Developed solvers based on the discontinuous Galerkin finite element method for a range of multiphysics problems, including the Euler–Euler model, mixture model, Cahn–Hilliard equation, and incompressible Navier–Stokes model.
- Numerical and code verification using the method of manufactured solutions.
- Tools Used: Python, NGSolve, NETGEN, PETSc, GMSH

### Steady Incompressible Navier-Stokes Solvers with Scalar Transport and Reaction

[SCGS](#) [SIMPLE](#)

- Finite-volume method solvers for the incompressible Navier-Stokes equations, implemented using various algorithms for velocity-pressure coupling including SIMPLE and SCGS algorithms.
- SIMPLE-based solver extended to include scalar transport and reaction source terms.
- Implementation of multiple convection and diffusion flux schemes.
- Tools Used: Python, NumPy, Numba, Matplotlib, SymPy

## Euler Equations Solver Using Flux Vector Splitting

[EULER-FVS](#) 

- Implemented a finite-volume method solver for the one-dimensional compressible Euler equations using various flux vector splitting schemes including Steger-Warming and Van Leer.
- Tools Used: Python, NumPy, SymPy, Matplotlib

## CFD Simulation of a Side-Dump Combustor with Variable Inlet Angles

- Performed CFD simulations of a turbulent airflow in a side-dump combustor.
- Validated simulation results against experimental velocity and turbulence data.
- Investigated the impact of side-inlet angle on fuel-air mixing.
- Conducted mesh refinement and error analysis to quantify discretization and modelling errors.
- Tools Used: Ansys CFX

## Publication (Under Review)

**Laminar dispersion force effects on two-fluid modelling and simulation of bubble column multiphase hydrodynamics**

Sept 2025

*Arshia Fazeli*, Sander Rhebergen, Nasser Mohieddin Abukhdeir,

## Volunteering

**VP Academic at University of Waterloo Chemical Engineering Graduate Student Association (CEGSA)**

*Jan 2022 - Jan 2023*

**Welfare Officer at UCL Technology Society**

*Aug 2020 - July 2021*

**Outreach Volunteer at Engineers Without Borders**

*Oct 2019 - Apr 2020*

**Engineer at UCL Project Impactive**

*Oct 2019 - Jan 2020*

## Awards

**CSChE 2024 Best Poster**

[git repo](#) , Nov 2024

**Garry L. Rempel Memorial Graduate Scholarship**

*May 2022*

**Best Final Design Project in Cohort**

*June 2021*

## Technologies

**Languages:** Python, Matlab, C++

**Skills:** Python, NumPy, Matplotlib, NGSolve, PETSc, OpenFOAM, Ansys CFX, ParaView, Git, LaTeX