Herman Mak

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Professional Summary

Fluid dynamics engineer with doctoral-level experience in applying numerical simulation and HPC workflows to complex aerodynamics problems, specialising in aeroelasticity and aerodynamic flow-structures. Strong track record of selecting appropriate modelling assumptions, interpreting results, making informed decisions drawing on interdisciplinary thinking, and communicating engineering conclusions to a broad range of stakeholders.

Work Experience

Doctoral Researcher in Fluid Dynamics Nov 2021 – Nov 2024

ONERA - The French Aerospace Lab & LadHyX - École polytechnique *Île-de-France, France*

- Conducted doctoral-level research in aeroelastic CFD with linear stability and resolvent analysis to enable optimal gust response prediction without full simulation of elastic structures subjected to predetermined gust shapes
- Developed aeroelastic HPC-based CFD framework with *FEniCSx* (*Python*) validated against previous results, selecting appropriate modelling assumptions, and making informed trade-offs between model fidelity and computational cost
- Analysed steady and unsteady flow structures, upstream turbulence/gusts, and wake behaviour to understand their impact on aerodynamic performance and stability
- Principal author of peer-reviewed conference proceeding and presentation, and peer reviewer at a conference on fluid-structure interactions: *Herman Mak, Olivier Marquet, Lutz Lesshafft. "Resolvent Analysis for Aerofoil Response to Optimal Gusts." FIV2024. Foz do Iguaçu, Brazil. 2-5 July 2024.*

Teaching Assistant Sep 2022 – May 2024

École polytechnique *Île-de-France, France*

- Developed and guided CFD and experimental fluid dynamics projects (including PIV, force balance measurements, hot wire, and smoke flow visualisation experiments in water/wind tunnels), diagnosing issues, and advising on appropriate approaches based on problem context
- Delivered tutorials in Aerodynamics and Physics lab modules, guiding students in advancing their engineering/scientific knowledge and thinking
- Evaluated technical reports and presentations, scrutinising the validity of assumptions, interpretation of results, and clarity of engineering conclusions

Peer Tutor Aug 2018 – Mar 2020

Quest University Canada *Squamish, BC, Canada*

- Tutored students and led academic workshops on quantitative reasoning, report writing, technical communication, course-specific question sets, and technical skills such as Excel and LaTeX
- Improved and digitised the collection of evaluation surveys, and reviewed collected evaluations to suggest actionable change
- Spearheaded internationalisation efforts of peer tutors at the university

Visiting Research Student Oct 2019 – Jan 2020

University of Southampton *Southampton, UK*

- Designed and conducted water-flume PIV experiments on aerofoil wake flow structures and separation, making comparisons of different aerofoil profiles and angles of attack, selecting measurement techniques and test conditions to balance experimental accuracy and practical constraints
- Built CAD models using *SolidWorks*, selected materials, and managed small-scale manufacturing
- Processed and presented PIV data using *PIVlab* (*MATLAB*), assessing data quality and uncertainty to ensure conclusions were consistent with qualitative observations and previous experiments

Education Technology Intern Jun 2018 – Aug 2018

Independent Schools Foundation Academy *Hong Kong*

- Managed the school's online learning platform during a staff vacancy that occurred unexpectedly during my tenure, ensuring seamless operation
- Automated yearly process and sped up the implementation of user requests by proactively learning and using *HTML*, *JavaScript*, and *MySQL*, putting the team weeks ahead of schedule

Education

MSc Advanced Aeronautical Engineering Oct 2020 – Sep 2021
Imperial College London | Distinction *London, UK*

- Thesis: *Semi-empirical optimisation of the shape of a surface reducing turbulent skin friction*
- Developed strong grounding in aerodynamics (including turbulence, flow control, aeroservoelasticity, and CFD), control theory, and structural analysis, as well as engineering best practices with application through coursework and thesis research

BA&Sc "How do fluids affect vehicles?" Aug 2016 – May 2020
Quest University Canada | GPA: 3.76/4.00 (equivalent to First-Class) *Squamish, BC, Canada*

- Thesis and final presentation: *An Analysis of Symmetric and Cambered Aerofoils in Low Reynolds Number Flow Using Particle Image Velocimetry (PIV)*
- Focused an interdisciplinary degree to a self-directed curriculum concentrated on exploring fluid dynamics and the built environment
- Trained to draw from insights across disciplines to tackle technical problems, and deliver written/oral analyses under tight time constraints due to the university's innovative teaching style
- Awarded Quest University Canada Scholarship, and President's List (multiple terms)

Relevant Skills

CFD/Engineering Tools: FEniCSx | gmsh | Paraview | Experience using commercial solvers (Star-CCM+)
CAD Tools: Experience preparing and modifying geometry with SolidWorks and Fusion 360
Developer Tools: Python | MATLAB | Git | Linux | HPC Systems (*SLURM/MPI*)
Other: Microsoft Office (incl. Excel) | Adobe Creative Suite | LaTeX
Languages: English (native) | Cantonese (native) | Mandarin (C2) | French (B2-C1)

Community Service

English Language Teaching Assistant for Immigrants Services Society of BC *Nov 2018 – Mar 2020*
Mentor/Big Brother to High School Students *Jan 2018 – Apr 2019*

Extracurricular Activities

- Member of the aerodynamics team for Imperial Formula Racing (designed nose-cone and body panels with *SolidWorks* and assessed forces and flow structures under tight development timelines with *Star-CCM+*)
- Member of Imperial College London Rocketry team for nozzle design
- MSc course representative
- Led and taught the Quest University Social Dance Club
- Peer reviewer for Quest University's academic journal