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Beverley YEO

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Research engineer with both experimental and computational fluid dynamics (CFD) experience seeking to develop better, faster, and more accurate turbulence models and CFD schemes using generalizable data-driven approaches.

EDUCATION

Nanyang Technological University, Singapore (NTU)

Master of Engineering (Mechanical & Aerospace Engineering) — Expected Dec 2022
Thesis: Investigating Galilean invariance in CFD — (Thesis under examination)

Bachelor of Engineering (Aerospace Engineering), Honors with Distinction — Aug 2017 - Jun 2021
Thesis: On the flow behavior of confined vortex-rings

Purdue University, West Lafayette, IN, USA – *Study abroad* — Jan 2020 - May 2020

PUBLICATIONS & PRESENTATIONS

Journal Papers
- Yeo K.W.B., Chan W.L., Elhadidi B. (2022). *Challenging the Galilean Invariance assumption in CFD*. Submitted to *Journal of Fluid Mechanics* (Dec 2022), under review.
- Yeo K.W.B., Koh J.Y., Long J., New T.H. (2020). *Flow transitions in collisions between vortex-rings and density interfaces*. Journal of Visualization 23:783-791. doi:10.1007/s12650-020-00666-7

Conference Presentations
- Yeo K.W.B., Koh J.Y., Long J., New T.H. (2019). *Flow transitions in collisions between vortex-rings and density interfaces*. 15th Asian Symposium on Visualization, Busan, South Korea, 2019.
- Yeo K.W.B., Koh J.Y., Long J., New T.H. (2019). *Flow transitions in collisions between vortex-rings and free surfaces*. 17th European Turbulence Conference, Turin, Italy, 2019.

RESEARCH EXPERIENCE

**Influence of High Transonic Mach Number in the Range 0.90 to 1.10
on Generalized Aerodynamic Forces for High Frequency Modes** — **Aug 2022 - present**
Institute of High Performance Computing (IHPC), A*STAR — *Supervisor: Dr. Daniel WISE*
- Project funded by Bombardier Inc. under Singapore Aerospace Programme Cycle 16.
- Compute aerodynamic coefficient matrices of CRM wing from 2.5D harmonic balance analysis using SU2.
- Evaluate and compare performance of doublet-lattice methods to conventional Navier-Stokes solvers in predicting aerodynamic forces at high frequency modes in transonic flow regimes using NASTRAN and in-house DLM codes.

Investigating Galilean invariance assumptions applied to CFD — **May 2021 - present**
School of Mechanical & Aerospace Engineering, NTU — *Supervisors: Dr. Wai Lee CHAN, Dr. Basman ELHADIDI*
- Project funded by Ministry of Education Academic Research Fund Tier 1 Grant.
- Computed wakes and forces from flow over cylinder in different reference frames with LES and DNS in OpenFOAM.
- Developed new adaptive meshing code that enables reuse of background mesh cells in simulation with overset grid.
- Co-supervised an undergraduate final-year project student and provided technical assistance with ANSYS Fluent.
- Initiated a collaboration with IHPC, A*STAR to process and perform modal decomposition on turbulent LES results.

On the flow behavior of confined vortex-rings — **Dec 2020 - Jun 2021**
School of Mechanical & Aerospace Engineering, NTU — *Supervisor: Dr. Daniel NEW*
- Computed flow properties of vortex-rings in confined cylindrical geometries using Unsteady RANS in ANSYS Fluent to investigate wall shear stress and pressure distributions induced by vortex-rings on walls of confinement geometry.
- Experimentally validated results of CFD simulations using colored dye flow visualization.
- Assisted with supervision of three undergraduate students by providing basic CFD training and data analysis.

Fusing engineering knowledge with communication skills — **May 2020 - Jun 2021**
College of Engineering, NTU — *Supervisor: Dr. Wai Lee CHAN*
- Project funded by Ministry of Education Tertiary Research Fund Grant.
- Analyzed statistics from participants' pre- and post-treatment test scores using ANOVA and MANOVA in MATLAB.
- Analyzed and summarized student participants' qualitative learning outcomes and feedback.
- Built webapp using NodeJS and SQL to automate participant attendance checking.

System Identification of VTOL UAV   **May 2019 - May 2021**
School of Mechanical & Aerospace Engineering, NTU   *Supervisor: Dr. Basman ELHADIDI*
- Develop least-square regression models combined with usage of MATLAB system identification toolbox to determine stability and aerodynamic coefficients from dynamic pitch response testing in wind tunnel

Investigating flow transitions in vortex-ring collisions   **Dec 2017 - Aug 2020**
School of Mechanical & Aerospace Engineering, NTU   *Supervisor: Dr. Daniel NEW*
- Performed flow visualization of vortex-ring collisions with density interfaces and free surfaces using planar laser-induced fluorescence (PLIF) and time-resolved particle-image velocimetry (TR-PIV) techniques.
- Processed TR-PIV data in MATLAB to obtain velocity and vorticity vector fields.

Simulations of propeller aeroacoustics (internship)   **Jun 2020 - Aug 2020**
Temasek Laboratories @ National University of Singapore
- Simulated and analyzed aerodynamic properties and aeroacoustics of unsteady flows using ANSYS Fluent.
- Generated meshes of propeller models from CAD files using Pointwise.

HONORS & AWARDS

2022 A*STAR National Science Scholarship (PhD) – *Full funding for doctoral studies under government sponsorship*
2021 T.H. New Flow Visualization Award – *Best flow visualization done by final-year project students*
2020 AY2019/20 Dean's List, School of Mechanical & Aerospace Engineering, NTU
          Spring 2020 Dean's List, Purdue University Aeronautics & Astronautics
          CNYSP Research Award (Gold)
2019 Best Presentation Student Award, 15th Asian Symposium on Visualization
2017 Nanyang Scholarship (CN Yang Scholars Programme)
          NTU College of Engineering (CoE) Dean's Award – *S$5,000*
          MAE Enrichment Grant – *S$7,000*

ACADEMIC SERVICE

Peer Instructor, CN Yang Scholars Club   **Sep 2019 - Aug 2020**
- Tutored junior CN Yang Scholars majoring in aerospace engineering by demonstrating solutions to example questions and preparing material to supplement lecture notes for aircraft propulsion and aerodynamics.

OTHER PROJECTS

Weird Take-off and Landing UAV   **Jan 2021 - May 2021**
Class project for MA4878 Unmanned Aerial Vehicles
- Led a team of 6 in constructing a unique fixed-wing quadcopter that trims at negative angle of attack.
- Performed dynamic pitch response tests in open wind tunnel for different motor thrust inputs.
- Performed numerical analysis in XFLR5 to obtain aerodynamic properties of aircraft.

Project Escalator   **Jan 2020 - May 2020**
Class project for AAE450 Spacecraft Design
- Worked with a team of 60 to numerically investigate propellantless space propulsion technologies and cycler vehicle trajectories to and from Mars using MATLAB, Simulink and GMAT.

Mini Delivery Quadcopter   **May 2018 - Aug 2018**
Class project for CY2003 Making & Tinkering
- Led a team of 4 in building and modifying a racing quadcopter for autonomous package delivery.
- Optimized part selection for minimum weight and maximum range in MATLAB.
- Designed and 3D-printed package container and release mechanism using SolidWorks.

SKILLS

Programming	MATLAB, C, C++, Python, Javascript, HTML, CSS, NodeJS, SQL, Bash scripting, LaTeX
Software	SolidWorks, ANSYS Fluent, OpenFOAM, SU2, TECPLOT, Paraview, Pointwise, Photoshop, Illustrator
Technical	Arduino, 3D printing, soldering, wind & water tunnel testing
Languages	English (native), Mandarin (fluent), Korean (basic)

– References available on request.