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Beverley YEO

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Research student with experience in both experimental and computational fluid dynamics (CFD) seeking to develop better, more efficient, and more accurate turbulence models and CFD methods using data-driven approaches.

EDUCATION

Nanyang Technological University, Singapore (NTU)

Master of Engineering (Mechanical & Aerospace Engineering) — Aug 2021 - Dec 2022
Thesis: Investigating Galilean invariance in CFD — CGPA: 4.63/5.00

Bachelor of Engineering (Aerospace Engineering), Honors with Distinction — Aug 2017 - Jun 2021
Thesis: On the flow behavior of confined vortex-rings — CGPA: 4.37/5.00

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

PUBLICATIONS & PRESENTATIONS

Journal Papers

- 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*

- Computed aerodynamic coefficient matrices of CRM wing from 2.5D frequency domain analysis using SU2.
- Evaluated and compared performance of doublet-lattice methods to conventional Navier-Stokes solvers in predicting aerodynamic forces at high frequency modes in transonic flow regimes using in-house DLM and FVM μSICS code.

Investigating Galilean invariance assumptions applied to CFD — **May 2021 - Present**
School of Mechanical & Aerospace Engineering, NTU — *Supervisor: 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.
- Led a collaboration with IHPC, A*STAR to post-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.
- Investigated 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.
- Co-supervised three undergraduate students by providing basic CFD training and assisting with analysis of data.
- Awarded the *T.H. New Flow Visualization Award* for best flow visualization done by final-year project student.

Fusing engineering knowledge with communication skills — **May 2020 - Jul 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.
- Communicated and coordinated schedules of researchers, instructors and student participants.
- Transcribed recorded focus group discussions with instructors and student participants.
- Built webapp using NodeJS and SQL to automate participant attendance checking.

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.
- Awarded *Certificate of Distinction* for top 10% of internship cohort.

Investigating flow transitions in vortex-ring collisions **Dec 2017 - Jul 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.
- Published first-author journal paper in *Journal of Visualization*.

HONORS & AWARDS

2022 A*STAR National Science Scholarship (PhD)
2021 T.H. New Flow Visualization Award – *Best flow visualization done by final-year project students*
Professional Attachment Certificate of Distinction – *Top 10% of internship cohort*
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)

ACADEMIC AFFILIATIONS

Agency for Science, Technology and Research, Singapore (A*STAR) Aug 2022 - present
European Mechanics Society (EUROMECH) Sep 2019 - present

ACADEMIC SERVICE

Peer Instructor, CN Yang Scholars Club **Sep 2019 - Aug 2020**
- Mentored junior CN Yang Scholars by providing guidance on academics, research and time management.
- Prepared guides and tutorials for junior CN Yang Scholars about maximizing their research attachments.
- 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 investigate propellantless space propulsion technologies and cycler vehicle trajectories to and from Mars using MATLAB, Simulink and GMAT.
- Numerically simulated space perturbation torques and forces for large cycler vehicle in MATLAB.
- Designed all logos and marketing material for the project using Adobe Photoshop.
- Built website using HTML and CSS to archive the project.
- Achieved grade of A+ and class rank #1 of 60 students.

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, TECPLOT, Paraview, Pointwise, Photoshop, Illustrator
Technical Arduino, 3D printing, soldering, wind & water tunnel testing
Languages English (native), Mandarin (fluent), Korean (basic)
Others Licensed laser operator (NEA N3 license)

– References available on request.