Beverley K.W. YEO

Curriculum Vitae

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Research engineer with both experimental and computational fluid dynamics (CFD) experience seeking to develop better turbulence models and CFD schemes using generalizable data-driven approaches and modern computing paradigms.

Education

Stanford University, Stanford, CA, USA
Doctor of Philosophy (Mechanical Engineering) — Sep 2023 - present

Nanyang Technological University, Singapore (NTU)
Master of Engineering (Mechanical & Aerospace Engineering) — Aug 2021 - Feb 2023
Thesis: Investigating Galilean invariance in CFD

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

Research Experience

Influence of high transonic Mach number on aerodynamic forces for high frequency modes — **Aug 2022 - Aug 2023**
*Institute of High Performance Computing (IHPC), A*STAR* — *Supervisors: Dr. Daniel WISE, Dr. Vinh-Tan NGUYEN*
- Project funded by Bombardier Inc. under Singapore Aerospace Programme Cycle 16.
- Developed and implemented harmonic balance-based framework for transonic flutter prediction of NASA CRM wings.

Investigating Galilean invariance assumptions applied to CFD — **May 2021 - Jun 2023**
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.
- 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 aerodynamics and aeroacoustics of propeller models using ANSYS Fluent and Pointwise.

Honors & Awards

2023 NUS Development Grant – *S$10,000 for research-related activities*

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) – *Full funding for undergraduate studies*
NTU College of Engineering Dean's Award and MAE Enrichment Grant – *S$12,000 total for enrichment activities*

Academic Affiliations

International Forum for Aviation Research (IFAR) Early-Career Network Jan 2023 - present
Agency for Science, Technology and Research, Singapore (A*STAR) Aug 2022 - present

Teaching & Service

Scientists-in-Schools Program, Zhangde Primary School **Sep 2022 - Apr 2023**

- Developed lesson plan and introduced Primary 5 students to Python programming and CFD/scientific computing.

Peer Instructor, CN Yang Scholars Club **Sep 2019 - Aug 2020**

- Mentored/tutored junior CN Yang Scholars majoring in aerospace engineering and prepared supplementary material.

Publications & Presentations

Journal Papers

- New T.H., Yeo K.W.B., Koh J.Y., Long J. (2023). *Flow transitions of vortex rings colliding head-on with free surfaces*. In preparation.
- Yeo K.W.B., Chan W.L., Elhadidi B. (2023). *Challenging the Galilean Invariance assumption in CFD*. In preparation.
- 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.

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
Languages English (native), Mandarin (fluent), Korean (basic)

– References available on request.