

Dion HO Jia Xu

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EDUCATION & SKILLS

YALE-NUS COLLEGE (BSc – Hons)

Aug 2017 – May 2021

- Major in Mathematical, Computational and Statistical Sciences (MCS) & Minor in Global Affairs

COLUMBIA UNIVERSITY (PhD)

Sep 2021 – May 2026 (expected)

- Applied Mathematics – Department of Applied Physics and Applied Mathematics (APAM)

Coding, presentation and design skills: Python, C, VBA, OCaml, R, Julia, MATLAB, Git, Mathematica; LaTeX, Beamer; Adobe Photoshop, InDesign, Premiere Pro and Animate; SolidWorks and Flow Simulation

RESEARCH EXPERIENCE

CAPSTONE PROJECT

Aug 2020 – May 2021

Professor David Andrew Smith

Determine the optimal distribution of flexural rigidity across a waving plate to maximise thrust

- Formulated an initial interface value problem (IIVP) for the Euler-Bernoulli beam equation through a piecewise flexural rigidity function and solved the IIVP using the Unified Transform Method (UTM)
- Compared the UTM approach to the beam equation with other analytic and numerical approaches including Chebyshev collocation with GMRES which was used by another researcher
- Calculated the average thrust generated by the waving motion of the plate for different distributions of flexural rigidity using the kinematics of the plate (solution to each beam equation), Joukowski transformations, and Euler's incompressible equations for inviscid fluid flow

SUMMER RESEARCH IN THE UNIFIED TRANSFORM LAB

May 2020 – Aug 2020

Professor David Andrew Smith

Extend the Unified Transform Method to solve an initial nonlocal value problem (INVP) for a wave-like equation on a finite domain with two general kernel integral boundary conditions

- Studied the limitations of existing analytic and numerical methods in addressing INVPs with general kernel integral boundary conditions
- Crafted novel techniques, theorems, and proofs to solve the INVP
- Drafted a paper for publication, awaiting input from supervisor

YALE COLLEGE DEAN'S RESEARCH FELLOWSHIP

Jun 2019 – Aug 2019

Professor Wilhelm Schlag & Dr Amir Sagiv

Awarded SGD6000 to travel to Yale University for ten weeks to numerically simulate the collision of two solitons of the nonlinear Schrodinger equation for different soliton size ratios and velocities

- Employed a variety of novel and standard numerical techniques including the Heun and Crank-Nicholsen (Runge-Kutta) methods, the shooting method, and the compact finite difference scheme
- Animated and classified the different collision dynamics: <https://tinyurl.com/y55o4jgv>
- Coded all algorithms in IPython and ran them using Yale's High-Performance Computing Cluster

YALE-NUS COLLEGE SUMMER RESEARCH PROGRAMME

May 2018 – Aug 2018

Professor David Andrew Smith

Awarded SGD1500 to review the Julia-based function approximation software package called ApproxFun

- Compared a variety of function approximation techniques against ApproxFun's Chebyshev polynomial based techniques
- Modified ApproxFun to approximate contour integrations and used the algorithm to implement the general solution to the linear Schrodinger equation as produced by the Unified Transform Method
- Collated findings into a lab report and presented research at the 2018 Yale-NUS Summer Research Symposium: <https://www.unifiedtransformlab.com/outputs.html>

EXTRACURRICULARS AND COMMUNITY SERVICE

- Awarded Student Organisation Leader of the Year Kingfisher Award 2019 in a campus-wide ceremony after being nominated by the Exco members of three student organisations

THE COSMOSCIENCE (YALE-NUS STUDENT SCIENCE PUBLICATION) Aug 2017 – May 2020

Writer and member of the Design Team; Editor-in-Chief since Jan 2019

- Presided over the design, editing and publication of print issues of *The Cosmoscience*, with articles published online at <https://issuu.com/thecosmoscience>
- Wrote two articles titled *Division by Zero* and *Aerodynamics of our Campus: The Venturi Effect*

ASHEN LIGHT (YALE-NUS ASTRONOMY SOCIETY) Aug 2017 – May 2019

Vice-President since Aug 2018

- Organised and led a 2-day-3-nights stargazing trip to Fraser's Hill, Malaysia, for 19 people
- Trained fellow students in the use of telescopes and in astronomy photoediting
- Led a collaboration with three other student organisations to publish an astronomy photojournal

THE OCTANT (YALE-NUS STUDENT NEWS PUBLICATION) Aug 2017 – May 2020

Writer and member of the Business Team; Senior Writer since March 2018

- Wrote 19 articles covering topics like Latin Honours controversy, a sit-in protest and the associated debate, as well as tenure and students' influence on the process: <https://theoctant.org/?s=Dion+Ho>
- Organised workshops and social events for members including a dialogue with the founder of *TODAY*, Singapore's second-most-read English newspaper, and a dialogue with an editor from *Bloomberg*

INK (YALE-NUS LITERARY COLLECTIVE) Aug 2017 – Dec 2019

- Edited and designed the Yale-NUS Literary Collective Anthology 2019: an anthology of about a dozen prose and poetry pieces from fellow students

UBI CARITAS (YALE-NUS CATHOLIC SOCIETY) Aug 2017 – Present

Cell Group Leader, Treasurer, and Exco member in-charge of fellowships since Aug 2019

- Facilitated or organised numerous Catholic events including three Catholic retreats
- Led weekly cell group meetings and presented at numerous sessions

PEOPLE'S ASSOCIATION (PA) & MEET-THE-PEOPLE (MPS) SESSIONS Mar 2015 – Present

PA volunteer; Petition writer serving Member-of-Parliament (MP) Mr Lim Biow Chuan

- Drafted petition letters at weekly MPS sessions on matters like housing, immigration, and education
- Organised three local tours for the underprivileged, about 80 individuals joined each tour
- Facilitated dialogues for grassroots leaders on matters like healthcare, ageing and youth engagement
- Headed a tutoring programme for children from underprivileged backgrounds
- Served on the logistics committee for the "Dakota Relocation Project": a project to help low income residents living in old public (HDB) flats in the Singapore Dakota area relocate to new housing