Dr Yidan Xue

Christabel Pankhurst Building
The University of Manchester, UK
yidan.xue@manchester.ac.uk

https://yidanxue.github.io
ORCID: 0000-0001-9532-8671
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Education

DPhil Engineering Science, *University of Oxford* Jan 2023
Thesis: Modelling oxygen transport and tissue damage in the human brain.
Supervisor: Professor Stephen Payne. Submission: Aug 2022/Viva: Oct 2022.

BEng (Hons) Mechanical Engineering, *The University of Edinburgh* Jul 2019
Dissertation: Computational simulation and validation of flows in branching blood vessels.
Supervisors: Drs Dong-hyuk Shin and Rudolf Hellmuth. First Class Honours.
I completed the first two years of my undergraduate study (2015–2017) at Xiamen University, China.

Employment

Research Associate, *School of Health Sciences, The University of Manchester* Aug 2024 – Present
Research Associate, *School of Mathematics, Cardiff University* Jan 2024 – Jul 2024
EPSRC PDRA, *Mathematical Institute, University of Oxford* Oct 2022 – Dec 2023
Retained Lecturer in Mathematics, *Jesus College, University of Oxford* Jan 2023 – Sep 2023
Research Intern, *Institute of Mechanics, Chinese Academy of Sciences* Jul 2018 – Sep 2018
Research Intern, *School of Engineering, The University of Edinburgh* May 2018 – Jul 2018

Publications

Journal Articles:

1. Payne, S. J., **Xue, Y.**, Kuo, J.-F. and El-Bouri, W. K. 2025. Transit time mean and variance are markers of vascular network structure, wall shear stress distribution and oxygen extraction fraction. *Biomechanics and Modeling in Mechanobiology*.
2. **Xue, Y.** 2025. Computing Stokes flows in periodic channels via rational approximation. *Proceedings of the Royal Society A*, **481**, 20240676.
3. **Xue, Y.**, Payne, S. J. and Waters, S. L. 2025. Stokes flows in a two-dimensional bifurcation. *Royal Society Open Science*, **12**, 241392.
4. **Xue, Y.**, Jabi, W., Woolley, T. E. and Kaouri, K. 2024. Modelling indoor airborne transmission combining architectural design and people movement using the VIRIS simulator and web app. *Scientific Reports*, **14**, 28220.
5. **Xue, Y.**, Waters, S. L. and Trefethen, L. N. 2024. Computation of two-dimensional Stokes flows via lightning and AAA rational approximation. *SIAM Journal on Scientific Computing*. **46**(2), pp.A1214–A1234. **[ESI Highly Cited Paper, SIAM Reproducibility Badge]**
6. **Xue, Y.**‡, Georgakopoulou, T.‡, van der Wijk, A.-E., Józsa, T. I., van Bavel, E.‡ and Payne, S. J.‡ 2022. Quantification of hypoxic regions distant from occlusions in cerebral penetrating arteriole trees. *PLOS Computational Biology*. **18**(8), e1010166. ‡: co-first/co-senior authors.
7. Miller, C., Padmos, R. M., van der Kolk, M., Józsa T. I., Samuels, N., **Xue, Y.**, Payne, S. J. and Hoekstra, A. G. 2021. In silico trials for treatment of acute ischemic stroke: design and implementation. *Computers in Biology and Medicine*. **137**, 104802.

8. **Xue, Y.**, El-Bouri, W. K., Józsa, T. I. and Payne, S. J. 2021. Modelling the effects of cerebral microthrombi on tissue oxygenation and cell death. *Journal of Biomechanics*. **127**, 110705. **[Special Issue on Thrombus Mechanics]**
9. **Xue, Y.**, Hellmuth, R. and Shin, D. 2020. Formation of vortices in idealised branching vessels: a CFD benchmark study. *Cardiovascular Engineering and Technology*. **11**(5), pp.544–559. **[Cover Image]**

Submitted Articles/Preprints:

10. Padmos, R. M., Józsa, T. I., **Xue, Y.**, Payne, S. J. and Hoekstra, A. G. 2024. A Multi-Scale Model for Perfusion-Based Infarct Estimation in Acute Ischaemic Stroke Patients. submitted.
11. Jabi, W., **Xue, Y.**, Woolley, T. E. and Kaouri, K. 2024. 3D Topological Modeling and Multi-Agent Movement Simulation for Viral Infection Risk Analysis, submitted. Also available on arXiv: https://doi.org/10.48550/arXiv.2408.16417
12. Lin, F., Zakeri, A., **Xue, Y.**, MacRaild, M., Dou, H., Zhou, Z., Zou, Z., Sarrami-Foroushani, A., Duan, J. and Frangi, A. F. 2025. From Pixels to Polygons: A Survey of Deep Learning Approaches for Medical Image-to-Mesh Reconstruction. submitted.

DPhil Thesis:

13. **Xue, Y.** 2022. *Modelling oxygen transport and tissue damage in the human brain.* DPhil thesis. University of Oxford.

Invited Talks

1. *Mechanistic simulations in real-world systems for medical device innovation*, Simulation Workshop (5-min lightning talk), AI for Research: How Can AI Disrupt the Research Process, The University of Manchester, UK, Jun 2025
2. *Computation of 2D Stokes flows via lightning and AAA rational approximation*, Physical and Applied Mathematics Seminar, The University of Manchester, UK, Nov 2024
3. *Modelling physiological flows and transport at low Reynolds numbers*, CIMIM Seminar (inaugural talk), The University of Manchester, UK, Oct 2024
4. *A state-of-the-art epidemic simulator and web app for viral transmission in indoor spaces*, SIAM Conference on the Life Sciences, Portland, Oregon, US, Jun 2024
5. *Computation of two-dimensional Stokes flows via lightning and AAA rational approximation*, Computational and Applied Math Seminar, Peking University, China, May 2024
6. *Computation of physiological flows and transport at low Reynolds numbers*, Applied and Computational Mathematics Seminar, Cardiff University, UK, Feb 2024
7. *Computation of 2D Stokes flows via lightning and AAA rational approximation*, Numerical Analysis Group Internal Seminar, University of Oxford, UK, May 2023
8. *Modelling oxygen transport in the human cerebral microvasculature*, British Applied Mathematics Colloquium, Bristol, UK, Apr 2023

Selected Contributed Talks

9. *Computation of 2D Stokes flows via lightning and AAA rational approximation*, Numerical Analysis in the 21st Century in honour of Nick Trefethen's retirement from Oxford, Oxford, UK, Aug 2023
10. *Modelling human cerebral tissue damage caused by acute ischaemic stroke*, 9th World Congress of Biomechanics (WCB), Taipei (online), Jul 2022

Teaching

University of Oxford, Mathematical Institute/Department of Engineering Science
One contact hour requires at least two hours of preparation and marking at Oxford.

Tutor, A1 Differential Equations 1, Oriel College, class size: 1–2, contact hours: 8	Fall 2023
Tutor, A7 Numerical Analysis, Jesus College, class size: 1–2, contact hours: 15	Spring 2023
Tutor, C5.6 Applied Complex Variables, MI, class size: 10–12, contact hours: 16	Spring 2023
Lead Tutor, B17 Biomechanics, EngSci, class size: 3–4, contact hours: 13	Spring 2022

Mentoring

Benjamin Nicholls-Mindlin, MSc MMSC project, **University of Oxford** 2023
Rational Stokes Methods for Tissue Engineering Applications, co-supervised with Professors Sarah Waters and Helen Byrne. The thesis received the second highest distinction.

Awards and Funding

(2024) **UK RS&IN Implementation Phase: Human Health (CERSIs)**, *UK CEiRSI - The UK's Centre of Excellence on In-silico Regulatory Science and Innovation - Pilot Phase*, Member of the Manchester Team & Academic Rapporteur of Pilot 4. PI: Professor Alejandro Frangi.
(2022) **EPSRC Postdoctoral Research Associate**, Mathematical Institute, University of Oxford. *One-year postdoctoral position awarded to up to 5 Oxford DPhil graduates.*
(2019) **IMechE Best Student Prize**, The University of Edinburgh.
(2018) **3rd Year Class Medal for Mechanical Engineering**, The University of Edinburgh.
(2018) **Edinburgh Award**, The University of Edinburgh.
(2018) **Summer Research Scholarship**, The University of Edinburgh.
(2017/2018) **2+2 Student Scholarships**, The University of Edinburgh.
(2016) **1st Prize Scholarship for Academic Excellence**, Xiamen University.

External Funding Applications (ongoing and unsuccessful)

(2025) **NIHR: Transformative and disruptive innovations to reduce waiting lists and waiting times**, Co-Applicant. PI: Professor Emily Henderson; WP Lead: Professor Alejandro Frangi.
(2025) **MRC: Novel Human In Vitro Models of Complex Disease**, Researcher Co-Lead. PI: Professor Tao Wang; WP Lead: Professor Alejandro Frangi.
(2023) **EPSRC Responsive Mode Grant**, Researcher Co-Lead, scoring 4, 5 and 6 out of 6. PI: Professor Sarah Waters.
(2023) **Schmidt AI in Science Postdoctoral Fellowship**, University of Oxford, shortlisted.
(2022) **EPSRC NFFDy Postdoctoral Fellowship (National Fellowships in Fluid Dynamics)**, invited for full proposal, scoring a 6/6 with high confidence and a 5/6.

Media

SIAM News (June 13, 2024) Epidemic Simulator and Web App Models Viral Transmission in Indoor Spaces.

Memberships

Society for Industrial and Applied Mathematics (SIAM), *Member*	2024 – Present
VPH Institute, *Member*	2020 – 2021, 2024 – Present

European Society of Biomechanics, *Member* 2023 – 2024

Service and Outreach

Outreach/Public Engagement:

Pint of Science (Manchester), *Organiser* 2024 – 2025

'Tech Me Out' events: '*From Virtual Patients to Real Solutions: Medical Innovation on Tap*', '*Learning to Decommission: Robots in the Nuclear World*' and '*The Enzyme Engineers: Crafting Life's Tiny Machines*', 12 speakers, more than 160 attendees.

The Welsh Government, *Policy Modelling Group, Member* 2024 – 2025

Institutional Service:

The University of Manchester:

Christabel Pankhurst Institute, *Fire Marshal* 2025 – Present

Recruitment Interview Panel, *Member* 2024

Cardiff University:

Vendor Selection Panel, *Member* 2024

University of Oxford:

Undergraduate Admissions Panel (Maths & Stats at Oriel College), *Member* 2023

Disability Advisory Service, *Non-Medical Support Worker* 2019 – 2020

Conference Organisation and Leadership

The 6th China-UK Forum of Young Scholars in Manchester "AI Applications Across Disciplines", *Invited Guest and Panel Judge* 2025

Virtual Imaging Trials in Medicine 2025, Innovative Computational Techniques in Medical Imaging, *Session Chair* 2025

Numerical Analysis in the 21st Century Conference, in honour of Nick Trefethen's retirement from Oxford, Numerical Methods for Differential Equations, *Session Chair* 2023

Journal Article Reviewer

Biotechnology and Bioengineering (Wiley), *Building Simulation* (Springer), *Cardiovascular Engineering and Technology* (Springer), *Computational Mechanics* (Springer), *IMA Journal of Numerical Analysis* (IMA), *Journal of Fluid Mechanics* (Cambridge), *PLOS Computational Biology* (PLOS).

Referees

Professor Alejandro Frangi, School of Health Sciences/Department of Computer Science, The University of Manchester, a.frangi@manchester.ac.uk

Professor Stephen Payne, Institute of Applied Mechanics, National Taiwan University, stephenpayne@ntu.edu.tw

Professor Nick Trefethen, School of Engineering and Applied Sciences, Harvard University, trefethen@seas.harvard.edu

Professor Sarah Waters, Mathematical Institute, University of Oxford, waters@maths.ox.ac.uk