
CURRICULUM VITAE

Dr Yidan Xue

Contact details

Christabel Pankhurst Building, The University of Manchester, Manchester M13 9PS, UK
Email: yidan.xue@manchester.ac.uk, ORCID: 0000-0001-9532-8671, Scopus ID: 57218122825
Website: <https://yidanxue.github.io>

Research Interests

Applied Mathematics: mathematical modelling, fluid mechanics, numerical analysis

Biomedical Engineering: in silico trials, microcirculation, biomechanics

Education

- 2023: DPhil Engineering Science, **University of Oxford**. Thesis: Modelling oxygen transport and tissue damage in the human brain.
- 2019: BEng (Hons) Mechanical Engineering, 1st class honours, **The University of Edinburgh**. Dissertation: Computational simulation and validation of flows in branching blood vessels.

Employment

- 2024.08–date: Postdoctoral Research Associate, School of Health Sciences, **The University of Manchester**.
- 2024.01–2024.07: Postdoctoral Research Associate, School of Mathematics, **Cardiff University**.
- 2022.10–2023.12: EPSRC Postdoctoral Research Associate, Mathematical Institute, **University of Oxford**.
- 2023.01–2023.09: Retained Lecturer in Mathematics, Jesus College, **University of Oxford**.
- 2018.07–2018.09: Research Intern, State Key Laboratory of High Temperature Gas Dynamics, **Chinese Academy of Sciences**.
- 2018.05–2018.07: Research Intern, School of Engineering, **The University of Edinburgh**.

Publications

1. **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.
2. **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.
3. 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.
4. **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.

5. **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.

Preprint/submitted articles

6. **Xue, Y.**, Payne, S. J. and Waters, S. L. 2024. Stokes flows in a 2D bifurcation, submitted. Also available on arXiv: <https://arxiv.org/abs/2309.11230>
7. Payne, S. J., **Xue, Y.**, Kuo, J.-F. and El-Bouri, W. K. 2024. Transit time mean and variance are markers of vascular network structure, wall shear stress distribution and oxygen extraction fraction, submitted.
8. 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.
9. **Xue, Y.** 2024. Computing Stokes flows in periodic channels via rational approximation, submitted. Also available on arXiv: <https://arxiv.org/abs/2407.14864>
10. 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>
11. **Xue, Y.**, Jabi, W., Woolley, T. E. and Kaouri, K. 2024. VIRIS: Simulating indoor airborne transmission combining architectural design and people movement, submitted. Also available on arXiv: <https://arxiv.org/abs/2408.11772>

DPhil thesis

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

Speaking invitations

- A state-of-the-art epidemic simulator and web app for viral transmission in indoor spaces, SIAM Conference on the Life Sciences, Portland, Jun 2024.
- Computation of two-dimensional Stokes flows via lightning and AAA rational approximation, Computational and Applied Math Seminar, Peking University, May 2024.
- Computation of physiological flows and transport at low Reynolds numbers, Applied and Computational Mathematics Seminar, Cardiff University, Feb 2024.
- Computation of 2D Stokes flows via lightning and AAA rational approximation, Numerical Analysis Group Internal Seminar, University of Oxford, May 2023.
- Modelling oxygen transport in the human cerebral microvasculature, British Applied Mathematics Colloquium, Bristol, Apr 2023.

Selected contributed talks/posters

- **Xue, Y.** 2023. *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. Presentation.
- **Xue, Y.**, Payne, S. and Waters, S. 2023. *Modelling blood flow in a micro-vessel bifurcation*. ESB2023, Maastricht, The Netherlands. Presentation.
- **Xue, Y.**, Józsa, T. I. and Payne, S. J. 2022. *Modelling human cerebral tissue damage caused by acute ischaemic stroke*. 9th World Congress of Biomechanics (WCB), Taipei (online). Presentation.

- **Xue, Y.** and Payne, S. J. 2020. *Modelling brain metabolism in ischaemic stroke: oxygen consumption and energy budget*. VPH2020, Paris (online), France. Poster.

Teaching

- 2023–2024: Tutor, A1 Differential Equations 1, Oriel College, **University of Oxford**. Tutoring 2nd Year Undergraduates (class size: 1-2). 8 contact hours (1 contact hour usually requires 2 hours of preparation and markings). Undergraduate admission interviews (18 candidates in Maths or Maths & CS).
- 2022–2023: Tutor, A7 Numerical Analysis, Jesus College, **University of Oxford**. Tutoring 2nd Year Undergraduates (class size: 1-2). 15 contact hours.
- 2022–2023: Tutor, C5.6 Applied Complex Variables, Mathematical Institute, **University of Oxford**. Teaching 4th Year Undergraduates (class size: 10-12). 16 contact hours.
- 2021–2022: Lead Tutor, B17 Biomechanics, Department of Engineering Science, **University of Oxford**. Tutoring 3rd Year undergraduates (class size: 3-4). 13 contact hours.

Supervision

- (2023) Benjamin Nicholls-Mindlin, MSc MMSc project, **University of Oxford**. *Rational Stokes Methods for Tissue Engineering Applications*, co-supervised with Professors Sarah Waters and Helen Byrne (Oxford) and Drs Rudolf Hellmuth, Yuan-Tsan Tseng and Najma Latif (Magdi Yacoub Institute). The thesis received the second highest distinction in the MSc programme.

Awards and funding

- (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.

Major funding applications

- (2023) EPSRC Responsive Mode Grant, Researcher Co-Lead, scoring 4, 5 and 6 out of 6.
- (2023) Schmidt AI in Science Postdoctoral Fellowship, shortlisted.
- (2022) EPSRC NFFDy Postdoctoral Fellowship (National Fellowships in Fluid Dynamics), scoring a 6/6 with high confidence and a 5/6.

Media coverage

- Epidemic Simulator and Web App Models Viral Transmission in Indoor Spaces, *SIAM News*, Jun 2024

Memberships

- (2024–date) Member, **Society for Industrial and Applied Mathematics (SIAM)**.
- Past memberships: **European Society of Biomechanics (ESB)** and **VPH Institute**.

Service, community and professional development

- (2024) Member, Policy Modelling Group, Welsh Government.
- (2023) Workshop on ‘Mental Health Awareness in Higher Education’, Mathematical Institute, **University of Oxford**.
- (2023) Undergraduate admissions in mathematics, Oriel College, **University of Oxford**.
- (2019–2020) Non-Medical Support Worker, Disability Advisory Service, **University of Oxford**.
- Session chair for “Numerical Methods for Differential Equations” at Numerical Analysis in the 21st Century Conference, in honour of Nick Trefethen’s retirement from Oxford.
- Reviewer for *Biotechnology and Bioengineering* (Wiley), *Cardiovascular Engineering and Technology* (Springer).

Referees

Professor Alex 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