CURRICULUM VITAE
Dr Yidan Xue

Contact details

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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

- 2024.01-date: 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.

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.

Contributed talks/posters

- Payne, S. J., El-Bouri, W. K., **Xue, Y.** 2024. *What do transit time distributions tell us about the vascular structure of cerebral cortical columns?* ESB2024, Edinburgh, UK. Poster.
- **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.
- Payne, S. J., Józsa, T. I., **Xue, Y.**, Wang, J., Howman, J. C., Newsome, M. Wei, W., Bing, Y., Chen, X., Daher, A., Tong, Z., and El-Bouri, W. K. 2022. *Mathematical models of the cerebral microcirculation in health and pathophysiology*. 7th International Conference on Computational and Mathematical Biomedical Engineering (CMBE22), Milan, Italy. Presentation.
- Padmos, R. M., Józsa, T. I., **Xue, Y.**, Payne, S. J. and Hoekstra, A. G. 2022. *A multi-scale tissue infarction model for modelling acute ischaemic stroke*. 7th International Conference on Computational and Mathematical Biomedical Engineering (CMBE22), Milan, Italy. Presentation.
- Padmos, R. M., Józsa, T. I., **Xue, Y.**, Payne, S. J. and Hoekstra, A. G. 2022. *Modelling Infarct Growth During Acute Ischeamic Stroke*. The 17th International Symposium on Biomechanics in Vascular Biology and Cardiovascular Disease, Rotterdam, The Netherlands. Presentation.
- **Xue, Y.**, Hellmuth, R. and Shin, D. 2020. *Formation of Vortices in Idealised Branching Vessels: A Parametric Validation Study with HELYX and Dakota*. VINAS Online Users Conference 2020, Tokyo (online), Japan. Presentation.

- **Xue, Y.** and Payne, S. J. 2020. *Modelling brain metabolism in ischaemic stroke: oxygen consumption and energy budget*. VPH2020, Paris (online), France. Poster.
- **Xue, Y.**, Hellmuth, R. and Shin, D. 2019. *Characteristics of Wakes in Branching Blood Vessels under Re = 500*. 32nd Scottish Fluid Mechanics Meeting, Dundee, UK. 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, *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, under review.
- (2023) Schmidt AI in Science Postdoctoral Fellowship, shortlisted.
- (2022) EPSRC NFFDy Postdoctoral Fellowship (National Fellowships in Fluid Dynamics), extremely positive reviews (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).

Referees

Dr Katerina Kaouri, School of Mathematics, Cardiff University, KaouriK@cardiff.ac.uk

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

Professor Nick Trefethen, SEAS, Harvard University, trefethen@seas.harvard.edu

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