Stanford

Catherine Spurin

Postdoctoral Scholar, Energy Resources Engineering

Curriculum Vitae available Online

Bio

BIO

I am a postdoctoral researcher in the Energy Science & Engineering department. My current research is focused on understanding how subsurface heterogeneity can be exploited to increase the amount of CO2 that is residually trapped. This increases storage security and minimizes the spread of the CO2 plume. This research makes up part of the GeoCquest consortium with Melbourne University, Cambridge University and CO2CRC. My supervisors are Prof. Hamdi Tchelepi and Prof. Sally Benson.

I obtained my PhD from Imperial College London in 2021. My PhD thesis "Intermittent flow pathways for multiphase flow in porous media: a pore-scale perspective" explored how flow phenomena not included in the framework of Darcy's law extended to multiphase flow influence the propagation and trapping of fluids. My supervisors were Prof. Sam Krevor and Prof. Martin Blunt. My research was funded by the President's PhD scholarship at Imperial.

HONORS AND AWARDS

- Ernest Edward Glorney Award, Imperial College London (2017)
- Undergraduate prize for achievement in the study of geophysics, British Geophysical Association (2015)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Committee member - Young Academy, Interpore (2023 - present)
- Committee member, Porous Media Tea Time Talks (2020 - present)

PROFESSIONAL EDUCATION

- Doctor of Philosophy, Imperial College of London (2021)
- Master of Science, Imperial College of London (2017)
- Bachelor of Science, Imperial College of London (2017)
- PhD, Department of Earth Science & Engineering, Imperial College London (2021)
- MSci, Department of Earth Science & Engineering, Imperial College London , Geophysics (2017)

STANFORD ADVISORS

- Sally Benson, Postdoctoral Faculty Sponsor

LINKS

- Personal website: https://cspurin.github.io/

Teaching

COURSES

2024-25

- Fundamentals of Multiphase Flow: ENERGY 121, ENERGY 221 (Win)

Publications

PUBLICATIONS

- **Dynamic Mode Decomposition of 4D imaging data to explore intermittent fluid connectivity in subsurface flows** *ADVANCES IN WATER RESOURCES*
  Raizada, A., Berg, S., Benson, S. M., Tchelepi, H. A., Spurin, C.
  2025; 203

- **Time-resolved 2D and 3D imaging of hydrogen and brine displacement processes in porous Clashach sandstone.** *Journal of colloid and interface science*
  Thaysen, E. M., Butler, I. B., Hassanpouryouzband, A., Spurin, C., Freitas, D., Rizzo, R., Alvarez-Borges, F., Atwood, R., Edlmann, K.
  2025; 694: 137704

- **The role of injection method on residual trapping: Insights into bridging scales and heterogeneity** *ADVANCES IN WATER RESOURCES*
  Spurin, C., Ellman, S., Bultreys, T., Kurotori, T., Benson, S., Tchelepi, H. A.
  2025; 197

- **Python Workflow for Segmenting Multiphase Flow in Porous Rocks** *TRANSPORT IN POROUS MEDIA*
  Spurin, C., Ellman, S., Sherburn, D., Bultreys, T., Tchelepi, H. A.
  2024

- **A Statistical Analysis of Fluid Interface Fluctuations: Exploring the Role of Viscosity Ratio.** *Entropy (Basel, Switzerland)*
  Heijkoop, S., Rieder, D., Moura, M., Rucker, M., Spurin, C.
  2024; 26 (9)

- **The role of injection method on residual trapping at the pore-scale in continuum-scale samples** *INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL*
  Spurin, C., Ellman, S., Bultreys, T., Tchelepi, H. A.
  2024; 131

- **Pore-Scale Fluid Dynamics Resolved in Pressure Fluctuations at the Darcy Scale** *GEOPHYSICAL RESEARCH LETTERS*
  Spurin, C., Roberts, G. G., O'Malley, C. P. B., Kurotori, T., Krevor, S., Blunt, M. J., Tchelepi, H.
  2023; 50 (18)

- **The FluidFlower Validation Benchmark Study for the Storage of CO2** *TRANSPORT IN POROUS MEDIA*
  Flemisch, B., Nordbotten, J. M., Ferno, M., Juanes, R., Both, J. W., Class, H., Delshad, M., Doster, F., Ennis-King, J., Franc, J., Geiger, S., Glaeser, D., Green, et al
  2023

- **Pore-Scale Imaging of Multiphase Flow Fluctuations in Continuum-Scale Samples** *WATER RESOURCES RESEARCH*
  Wang, S., Spurin, C., Bultreys, T.
  2023; 59 (6)

- **Dynamic mode decomposition for analysing multi-phase flow in porous media** *ADVANCES IN WATER RESOURCES*
  Spurin, C., Armstrong, R. T., McClure, J., Berg, S.
  2023; 175

- **Red Noise in Steady-State Multiphase Flow in Porous Media** *WATER RESOURCES RESEARCH*
  Spurin, C., Rucker, M., Moura, M., Bultreys, T., Garfi, G., Berg, S., Blunt, M. J., Krevor, S.
  2022; 58 (7)

- **Determination of the spatial distribution of wetting in the pore networks of rocks.** *Journal of colloid and interface science*
  Garfi, G., John, C. M., Rucker, M., Lin, Q., Spurin, C., Berg, S., Krevor, S.
  1800; 613: 786-795