# Chris Vales

Research Associate
Department of Mathematics
Dartmouth College
Hanover, NH 03755, USA

chris.vales@dartmouth.edu
Personal webpage
Google Scholar profile

## Research interests

Applied analysis & operator theory; nonlinear, multiscale dynamics; numerical methods & high performance computing; applications in fluid & plasma dynamics.

## Appointments

| | |
|---|---|
| 2024– | Research associate, *Mathematics, Dartmouth College, USA*.<br>Advisor: Dimitrios Giannakis. |
| 2023– | External collaborator, *Lawrence Livermore National Laboratory, USA*.<br>Collaborators: Siu Wun Cheung, Youngsoo Choi, Dylan M. Copeland. |
| 6–8/2023 | Research intern, *Lawrence Livermore National Laboratory, USA*.<br>Funded by NSF-MSGI award.<br>Advisors: Siu Wun Cheung, Youngsoo Choi, Dylan M. Copeland. |

## Education

| | |
|---|---|
| 2020–2024 | PhD in Applied mathematics, *University of New Hampshire, USA.*<br>Advisor: Marianna Shubov. |
| 2018–2019 | PhD student in Fluid dynamics, *KTH Royal Institute of Technology, Sweden*.<br>Advisors: Dan Henningson, Bruno Eckhardt (deceased). |
| 2012–2017 | Diploma in Mechanical engineering, *Aristotle University, Greece*.<br>Specialization: Aeronautics and engines. |

## Publications

6. Axel Larsson, Minji Kim, **Chris Vales**, Sigrid Adriaenssens, Dylan M. Copeland, Youngsoo Choi and Siu Wun Cheung. Hyper-reduction methods for accelerating nonlinear finite element simulations: open source implementation and reproducible benchmarks. Submitted to *Arch. Comput. Methods Eng. arXiv:2602.23551*, 2026.
5. **Chris Vales** and Dimitrios Giannakis. Accelerated decomposition of bistochastic kernel matrices by low rank approximation. Under review in *Found. Data Sci. arXiv:2510.26574*, 2025.
4. **Chris Vales**, David C. Freeman, Joanna Slawinska and Dimitrios Giannakis. Quantum mechanical closure of partial differential equations with symmetries. Under review in *J. Comput. Phys. arXiv:2505.07519*, 2025.
3. **Chris Vales**, Siu Wun Cheung, Dylan M. Copeland and Youngsoo Choi. Machine-precision energy conservative reduced models for Lagrangian hydrodynamics by quadrature methods. *arXiv:2508.21279*, 2025.
2. **Chris Vales**. Spectral analysis of a coupled bending-torsion beam energy harvester: asymptotic results. *J. Math. Anal. Appl.* 544(2):129072, 2025.
1. **Chris Vavaliaris**, Miguel Beneitez and Dan S. Henningson. Optimal perturbations and transition energy thresholds in boundary layer shear flows. *Phys. Rev. Fluids* 5:062401(R), 2020.

## Talks

10. Data based statistical closure of partial differential equations. *Tufts Math*, Medford, MA, 4/2026.
9. Data based statistical closure of partial differential equations. *SIAM UQ26*, Minneapolis, MN, 3/2026.

8. Data driven spatiotemporal pattern extraction: application to 2D plasma edge turbulence. *APS DPP 2025*, Long Beach, CA, 11/2025.
7. Data driven dynamical closure of partial differential equations. *Caltech CMS*, Pasadena, CA, 11/2025.
6. Quantum mechanical closure of PDEs with symmetries. *SIAM DS25*, Denver, CO, 5/2025.
5. Energy conservative reduction of lagrangian hydrodynamics by quadrature methods, *WCCM 2024*, Vancouver, BC, 7/2024.
4. Energy conservative reduction of lagrangian hydrodynamics by quadrature methods, *Dartmouth Math*, Hanover, NH, 3/2024.
3. Energy conservative quadrature-based dimensionality reduction for nonlinear hydrodynamics problems, *NSF MSGI Symposium*, online, 8/2023.
2. Optimal initial perturbations and the minimal seed of Blasius boundary layer flow, *17th European Turbulence Conference*, Turin, Italy, 9/2019.
1. Amplitude equations for subcritical transition in inhomogeneous shear flows, *CISM International Summer School*, Udine, Italy, 6/2019.

## Funding and awards

| | |
|---|---|
| 5/2025 | CRM 2025 Travel Award (declined), Centre de Recherches Mathématiques. |
| 7/2024 | WCCM 2024 Travel Award, US Association for Computational Mechanics. |
| 2023–2024 | Dissertation Year Fellowship, University of New Hampshire. |
| 6–8/2023 | Mathematical Sciences Graduate Internship, National Science Foundation. |
| 1–3/2018 | Erasmus Internship Grant, European Union. |

## Teaching

| | |
|---|---|
| 2026– | Instructor, *Dartmouth College, USA.*<br>Dynamical systems with applications. |
| 2020–2023 | Teaching Assistant, *University of New Hampshire, USA.*<br>Fluid mechanics; Material mechanics; Engineering computation; Mathematics with Matlab; Mathematics for business applications. |
| 2019–2020 | Teaching Assistant, *KTH Royal Institute of Technology, Sweden.*<br>Solid mechanics. |

## Professional activities

| | |
|---|---|
| Reviewer | Physica D, APL Computational Physics. |

## Skills

| | |
|---|---|
| Programing | C, C++, Fortran, Python, Matlab, OpenMP, MPI, Cuda, Make, Git, Gdb, Gprof. |
| Languages | English (fluent), German (B2), Greek (native). |