

Travis Askham

Curriculum Vitae

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Education and Qualifications

2016 Ph.D. New York University
2010 M.A. University of California Los Angeles
2010 B.Sc. University of California Los Angeles

Professional Appointments

2019 – Assistant Professor, Department of Mathematical Sciences, New Jersey Institute of Technology

Publications

Journal Articles & Thesis

- [1] Peng Zheng, Travis Askham, Steven L Brunton, J Nathan Kutz, and Aleksandr Y Aravkin, A unified framework for sparse relaxed regularized regression: Sr3. *IEEE Access*, 7:1404–1423, 2019.
- [2] Travis Askham, A stabilized separation of variables method for the modified biharmonic equation. *Journal of Scientific Computing*, 76(3):1674–1697, 2018.
- [3] Travis Askham and J Nathan Kutz, Variable projection methods for an optimized dynamic mode decomposition. *SIAM Journal on Applied Dynamical Systems*, 17(1):380–416, 2018.
- [4] Manas Rachh and Travis Askham, Integral equation formulation of the biharmonic dirichlet problem. *Journal of Scientific Computing*, 75(2):762–781, 2018.
- [5] Chang Sun, Travis Askham, and J Nathan Kutz, Stability and dynamics of microring combs: elliptic function solutions of the lugiato-lefever equation. *JOSA B*, 35(6):1341–1353, 2018.
- [6] Travis Askham and Antoine J Cerfon, An adaptive fast multipole accelerated poisson solver for complex geometries. *Journal of Computational Physics*, 344:1–22, 2017.
- [7] Travis Askham, *Integral-equation methods for inhomogeneous elliptic partial differential equations in complex geometry*. Ph.D. thesis, New York University, 2016.
- [8] Travis Askham and Leslie Greengard, Norm-preserving discretization of integral equations for elliptic pdes with internal layers i: the one-dimensional case. *SIAM Review*, 56(4):625–641, 2014.

Preprints

- [1] Emily Clark, Travis Askham, Steven L Brunton, and J Nathan Kutz, Greedy sensor placement with cost constraints. *arXiv preprint arXiv:1805.03717*, 2018.
- [2] Niall M Mangan, Travis Askham, Steven L Brunton, J Nathan Kutz, and Joshua L Proctor, Model selection for hybrid dynamical systems via sparse regression. *arXiv preprint arXiv:1808.03251*, 2018.
- [3] Travis Askham, Peng Zheng, Aleksandr Aravkin, and J Nathan Kutz, Robust and scalable methods for the dynamic mode decomposition. *arXiv preprint arXiv:1712.01883*, 2017.

Honors & Awards

2016 Wilhelm Magnus Memorial Prize, Courant Institute of Mathematical Sciences
2010 Daus Award in Mathematics, University of California Los Angeles

Grants & Fellowships

2015 Dean's Dissertation Fellowship, New York University
2010–2015 Henry M. MacCracken Fellowship, New York University

Teaching Experience

University of Washington

Scientific Computing (**Instructor**, AMATH 481, 38 students)

Courant Institute of Mathematical Sciences

Numerical Methods I (Reader)

Analysis I (Teaching Assistant)

Ordinary Differential Equations (Teaching Assistant)

Research Experience

- 2016–2018 Research Associate, Department of Applied Mathematics, University of Washington.
Principal Investigator: J. Nathan Kutz. Project: Sparse measurements and optimal sensor placement for classification and state estimation of complex systems
- 2012–2015 Research Assistant, Courant Institute of Mathematical Sciences, New York University.
Principal Investigator: Leslie Greengard. Project: Novel methods for electromagnetic simulation and design

Invited Speaking

Department Seminars

- 2018 A Fredholm operator approach to clamped plate problems, Simon Fraser University.
Burnaby, BC, Canada
- 2018 Tailored low-rank matrix approximation: two stories, NJIT. Newark, NJ, USA

Conference Activity

Participation

- 2018 Talk. A stable, kernel dependent FMM for fluid flow, ICOSAHOM, London, Greater London, UK
- 2018 Talk. Robust and scalable methods for the dynamic mode decomposition, SIAM Uncertainty Quantification conference, Garden Grove, CA, USA
- 2018 Talk. Adaptive grids for embedded integral equation based solvers, ICERM Workshop on Point Configurations. Providence, RI, USA
- 2017 Talk. Robust and scalable methods for the dynamic mode decomposition, SIAM Pacific Northwest Regional Meeting. Corvallis, OR, USA
- 2017 Talk. A stabilized FMM for fluid flow, BIRS-CMO Workshop on Creeping Flows. Oaxaca, OAX, Mexico
- 2017 Talk. Variable projection for Generalizing the Dynamic Mode Decomposition, SIAM CSE. Atlanta, GA, USA
- 2017 Talk. An algorithm for the DMD with unevenly spaced time samples, BIRS Workshop on Data-Driven Methods. Banff, Alberta, Canada
- 2016 Talk. Integral-Equation Methods for Inhomogeneous Elliptic PDEs (and applications), SIAM Annual Conference. Boston, MA, USA
- 2014 Poster. Volume Integrals in Complex Geometry: A Case Study of Poisson's Equation, CBMS-NSF Conference: Fast-Direct Solvers for Elliptic PDEs, Dartmouth College. Hanover, NH, USA
- 2013 Poster. On the discretization of integral equations for divergence-form PDEs with internal layers, Integral Equations Methods: Fast Algorithms and Applications (BIRS Workshop), Banff International Research Station. Banff, Alberta, Canada
- 2013 Talk. On the discretization of integral equations for elliptic PDEs with internal layers, Mid-Atlantic Numerical Analysis Day, Temple University. Philadelphia, PA, USA

Organization

- 2018 Mini symposium. High-Order Integral Equation Methods in Fluid Dynamics, ICOSA-HOM. London, Greater London, UK
- 2018 Mini symposium. Data-driven discovery for dynamical systems, SIAM UQ. Garden Grove, CA, USA
- 2017 Mini symposium. Data-driven characterization, control, and uncertainty quantification of dynamical systems, SIAM CSE. Atlanta, GA, USA

Service to Profession

Referee

- Elsevier *Journal of Computational Physics*
- SIAM *Scientific Computing (SISC)*, *Applied Dynamical Systems (SIADS)*
- Springer *Advances in Computational Mathematics*
- Wiley *Complexity* (Hindawi)
- IEEE *Transactions on Automatic Control (IEEE-TAC)*

Member

- SIAM (since 2011)

Software

- optdmd A MATLAB package for computing the optimized dynamic mode decomposition (available under the MIT license, github.com/duqbo/optdmd)
- RobustDMD A julia package for fitting exponential functions to data with robust penalties (available under the MIT license, github.com/UW-AMO/RobustDMD.jl)
- mbh2dfmm A Fortran package for stably computing fast sums of the modified biharmonic Green's function and modified Stokes kernels (available under a modified freeBSD license, github.com/duqbo/mbh2dfmm)

Skills

Coding

- Mastery Fortran (77-95), MATLAB
- Proficiency C99/C++, L^AT_EX, Python, julia
- Familiarity OpenMP, OpenCL (in C99), PHP, HTML

Speaking & Reading

- English (native)
- Spanish (elementary proficiency)

Biographical

- Born 1987. Walnut Creek, CA, USA
- Citizen United States