

Jeffrey M. Hokanson

Curriculum Vitae · 12 October 2020

Department of Computer Science
University of Colorado at Boulder
1111 Engineering Dr.
Boulder, CO 80309

U.S. Citizen
(832) 655-3185
<http://www.hokanson.us>
Jeffrey.Hokanson@colorado.edu

Appointments

University of Colorado Boulder

Postdoctoral Fellow with Paul G. Constantine (September 2017 – present)
Invited participant in *Model and Dimension Reduction in Uncertain and Dynamic Systems* semester workshop at the *Institute for Computational and Experimental Research in Mathematics (ICERM)* (January 2020 – May 2020)

Colorado School of Mines

Postdoctoral Fellow with Paul G. Constantine (October 2016 – September 2017)

University of Texas MD Anderson Cancer Center

Postdoctoral Fellow with Jared Burkes (March 2014 – September 2016)

Education

Rice University

Ph.D. Computational and Applied Mathematics, December 2013
Thesis: *Numerically Stable and Statistically Efficient Algorithms for Large Scale Exponential Fitting*
Advisors: Mark Embree and Steven Cox

Rice University

M.A. Computational and Applied Mathematics, May 2009
Thesis: *Magnetic Damping of an Elastic Conductor*
Advisors: Mark Embree and Steven Cox

Rice University

B.S. Physics, May 2007, cum laude

Submitted Manuscripts

2. Jeffrey M. Hokanson

Multivariate Rational Approximation Using a Stabilized Sanathanan-Koerner Iteration
arXiv: 2009.10803

1. Jeffrey M. Hokanson and Paul G. Constantine

A Lipschitz Matrix for Parameter Reduction in Computational Science
in revision at SIAM Journal on Scientific Computing
arXiv:1906.00105

Journal Publications

6. Jeffrey M. Hokanson and Caleb C. Magruder

H_2 -Optimal Model Order Reduction Using Projected Nonlinear Least Squares
accepted at SIAM Journal on Scientific Computing
arXiv:1811.11962

5. **Jeffrey M. Hokanson**
A Data-Driven McMillan Degree Lower Bound
 accepted at SIAM Journal on Scientific Computing
 arXiv:1803.00043
4. **Jeffrey M. Hokanson** and Paul G. Constantine
Data-driven Polynomial Ridge Approximation Using Variable Projection
 SIAM Journal on Scientific Computing, Volume 40 No. 3 (2018) pp. A1566–A1589
 DOI:10.1137/17M1117690, arXiv:1702.05859
3. **Jeffrey M. Hokanson**
Projected Nonlinear Least Squares for Exponential Fitting
 SIAM Journal on Scientific Computing, Volume 39 No. 6 (2017) pp. A3107–A3128
 DOI:10.1137/16M1084067, arXiv:1508.05890
2. Paul G. Constantine, Armin Eftekhari, **Jeffrey Hokanson**, and Rachel A. Ward
A Near-stationary Subspace for Ridge Approximation
 Computer Methods in Applied Mechanics and Engineering, Volume 326 (Nov 2017) pp. 402–421
 DOI:10.1016/j.cma.2017.07.038, arXiv:1606.01929
1. Steven J. Cox, Mark Embree, and **Jeffrey M. Hokanson**
One Can Hear the Composition of a String: Experiments with an Inverse Eigenvalue Problem
 SIAM Review, 54 (2012) pp. 157–178
 DOI:10.1137/080731037

Refereed Conference Proceedings

1. Paul G. Constantine, **Jeffrey M. Hokanson**, and Drew P. Kouri
Ridge Approximation and Dimension Reduction for an Acoustic Scattering Model
 2018 International Applied Computational Electromagnetics Society (ACES) Symposium Denver, CO
 DOI:10.23919/ROPACES.2018.8364321

Technical Reports

1. **Jeffrey M. Hokanson** and Caleb C. Magruder
Least Squares Rational Approximation
 arXiv:1811.12590

Course Notes

1. Steven J. Cox, Mark Embree, **Jeffrey M. Hokanson**
CAAM335 Matrix Analysis: Physical Laboratory
 available at: <http://www.caam.rice.edu/caam335lab>

Software

PSDR An open source Python toolbox for parameter space dimension reduction
<https://github.com/jeffrey-hokanson/psdr>

SYSMOR An open source Python toolbox for system-theoretic model reduction
<https://github.com/jeffrey-hokanson/sysmor>

PolyRat An open source Python toolbox for polynomial and rational approximation
<https://github.com/jeffrey-hokanson/polyrat>

Invited Talks

8. *Using the Lipschitz Matrix for Dimension Reduction*
National Institute of Standards, 2020
7. *Exploiting Low-Dimensional Structure in Optimization Under Uncertainty*
Tufts University, 2018
6. *Exploiting Low-Dimensional Structure in Optimization Under Uncertainty*
University of Colorado Denver, 2018
5. *Exploiting Ridge Structure in Chance-Constrained Design Under Uncertainty*
Stanford University, 2017
4. *Exploiting Ridge Structure in Chance-Constrained Design Under Uncertainty*
Sandia National Labs, 2017
3. *Using Projected Nonlinear Least Squares to Measure Eigenvalues*
Tufts University, 2017
2. *Trading Statistical Efficiency for Speed in Parameter Estimation Problems*
Virginia Tech, 2015
1. *Fast Automatic System Identification Using Optimization*
Katholieke Universiteit Leuven, 2010

Conference Presentations

11. *H_2 -optimal Model Order Reduction Using Projected Nonlinear Least Squares*
Mathematics of Reduced Order Models (ICERM), Providence, RI 2020
10. *Exploiting Ridge Structure in Chance-Constrained Optimization Under Uncertainty*
SIAM CSE19, Spokane, WA, 2019
9. *Exploiting Ridge Structure in Bayesian Inference*
SIAM UQ18, Orange County, CA, 2018
8. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
15th Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, 2018
7. *Active Subspace or Ridge Approximation?*
International Conference for High Performance Computing, Networking, Storage and Analysis (SC17), Denver, CO, 2017
6. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
3rd Annual Meeting of SIAM Central States Section, Fort Collins, CO, 2017
5. *Projected Nonlinear Least Squares for Impulse Response System Identification*
3rd Annual Meeting of SIAM Central States Section, Fort Collins, CO, 2017
4. *Fast Data-Driven System Identification from Impulse Response Measurements*
SIAM Conference on Computational Science and Engineering, Atlanta, GA, 2017
3. *Fast Minimum Uncertainty Estimates for the Exponential Fitting Problem*
SIAM Annual Meeting, Boston, MA, 2016
2. *CLEAN Corrects Variation in Sample Preparation*
CYTO2016, Seattle, WA, 2016

1. *Fast Automatic System Identification Using Optimization*
16th Congress of the International Linear Algebra Society, Pisa, Italy, 2010

Conference Posters

7. *Exploiting Ridge Structure in Chance Constrained Design Under Uncertainty*
SIAM UQ18, Orange County, CA, 2018
6. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
Conference on Data Analysis (CoDA), Santa Fe, NM, 2018
5. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
Statistical Perspectives on Uncertainty Quantification, Atlanta, GA, 2017
4. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
USACM Workshop on Uncertainty Quantification and Data-Driven Modeling, Austin, TX, 2017
3. *Data-driven Polynomial Ridge Approximation Using Variable Projection*
SIAM Conference on Computational Science and Engineering, Atlanta, GA, 2017
2. *High Dimensional Cytometry Data Visualization Using Parallel Coordinates*
CYTO2016, Seattle, WA, 2016
1. *Speeding Large Nonlinear Least Squares Problems by Near-Optimal Data Compression*
MMDS, Berkeley, CA, 2014

Intramural Presentations

2. *\mathcal{H}_2 -optimal Model Reduction Using Projected Nonlinear Least Squares*
University of Colorado Boulder, 2018
1. *Exploiting Low-Dimensional Structure in Optimization Under Uncertainty*
University of Colorado Boulder, 2018

Workshops

Model and Dimension Reduction in Uncertain and Dynamic Systems
ICERM. Providence, RI, USA 2020

Model Reduction of Transport-dominated Phenomena
Einstein Foundation & TU Berlin. Berlin, Germany, 2015

Gene Golub SIAM Summer School
Selva di Fasano, Italy, 2010

Funding

Cancer Center Support Grant: New Technology Grant PHS398
Web User Interface for High Parametric Analysis (PI)
Co-PI: Jared Burks
\$30,000 (2014)

Travel Funding

SIAM Travel Award for DR17 (\$650), 2017
USACM Travel Award (\$1000), 2017
Shared Resource Lab Travel Award (\$1000), 2016

Gene Golub SIAM Summer School Travel Award, 2010

Teaching Experience

CAAM 335 Lab: Matrix Analysis Laboratory, Rice University

Teaching Assistant

Fall 2007, Spring 2008, Fall 2009, Spring 2010

CAAM 336: Differential Equations in Science and Engineering, Rice University

Instructor of Record

Fall 2010, Spring 2012

Service

President, Rice University SIAM Student Chapter, May 2008 – May 2009

Organized Minisymposium at CSE19: MS316 *Rational Approximation and its Applications*

Referee: • SIAM Journal on Scientific Computing • SIAM/ASA Journal on Uncertainty Quantification • Advances in Computational Mathematics • Operators and Matrices • Journal of Graphical and Computational Statistics

Science Fair Judge: • Denver Metro Regional Science Fair 2017 • Colorado Science and Engineering Fair 2019

Mentoring

Worthing Rice Apprenticeship Program, 2007-2008

Ibrohim Nosirov, March 2017-present

placed 2nd in Medical and Health Science, Colorado State Science Fair, 2017

manuscript *A Numerical Investigation of the Minimum Width of a Neural Network*, arXiv:1910.13817

References

Paul Constantine

Assistant Professor, University of Colorado at Boulder

`Paul.Constantine@colorado.edu`

(303) 735-7618

Mark Embree

Hamlett Professor of the Academy of Integrated Science, Virginia Tech

`embree@vt.edu`

(540) 231-9592

Serkan Gugercin

A.V. Morris Professor of Mathematics, Virginia Tech

`gugercin@math.vt.edu`

(540) 231-6549

James Adler

Associate Professor, Tufts University

`James.Adler@tufts.edu`

(617) 627-2354

Michael B. Wakin

Professor, Colorado School of Mines

`mwakin@mines.edu`

(303) 273-3607