Jeffrey M. Hokanson

Curriculum Vitae · 12 October 2020

Department of Computer Science
University of Colorado at Boulder
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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
The Lipschitz Matrix: A Tool for Parameter Space Dimension Reduction
in revision at SIAM Journal on Scientific Computing
arXiv:1906.00105

Journal Publications

6. **Jeffrey M. Hokanson** and Caleb C. Magruder
$\mathcal{H}_2$-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`

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. *$\mathcal{H}_2$-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
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Mark Embree
Hamlett Professor of the Academy of Integrated Science, Virginia Tech
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