
Publication List

Robert Baraldi (rjbaral@sandia.gov)

Uncertainty Quantification and Optimization, Sandia National Laboratories*

In Review*

3. Harbir Antil, **Robert Baraldi**, Rohit Khandelwal, Drew Kouri (2025), “An Adaptive Finite Element Trust-Region Method for Regularized PDE-Constrained Optimization”, *SIAM Journal on Scientific Computing*.
 2. **Robert Baraldi**, Aurya Javeed, Drew P. Kouri, Katya Scheinberg (2025), “[ProxSTORM – A Stochastic Trust-Region Algorithm for Nonsmooth Optimization](#)”. *Computational Optimization and Applications*.
 1. **Robert Baraldi**, Michael Hintermüller, Qi Wang (2025) “A Multilevel Proximal Trust-Region Method for Nonsmooth Optimization with Applications to Scientific Machine Learning”. *Optimization Methods and Software*.
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Peer-Reviewed

17. Harbir Antil, **Robert Baraldi**, Drew Kouri (2024), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, *Optimization and Engineering* (to appear).
16. **Robert Baraldi**, Stefan Wild, Sven Leyffer (2023), “[Using Filter Methods to Guide Convergence for ADMM with Applications to Nonnegative Matrix Factorization](#)” *Journal of Optimization Theory and Applications* (to appear).
15. **Robert Baraldi**, Paul Manns, “[Coordinate Descent for Total-Variation Integer Optimal Control](#)”, *SIAM Journal on Control and Optimization* 63(6), 3825–3855.
14. **Robert Baraldi**, Drew P. Kouri (2025), “[Efficient Proximal Subproblem Solvers for a Nonsmooth Trust-Region Method](#)”, *Computational Optimization and Applications* 90, 193-226.
13. **Robert Baraldi**, Drew P. Kouri (2024), “[Local Convergence Analysis of an Inexact Trust-Region Method for Nonsmooth Optimization](#)”, *Optimization Letters* 18, 663-680.
12. **Robert Baraldi**, Aleksandr Aravkin, Dominique Orban (2024), “[A Levenberg - Marquardt Method for Nonsmooth Regularized Least Squares](#)”, *SIAM Journal on Scientific Computing* 46(4), A2557-A2581.
11. **Robert Baraldi**, Drew P. Kouri (2023), “[A Proximal Trust-Region Method for Nonsmooth Optimization with Inexact Function and Gradient Evaluations](#)”, *Mathematical Programming*. 201(1), 559-598.
10. Christopher Liu, Donsub Rim, **Robert Baraldi**, Randall LeVeque, Kenjiro Terada (2022), “[Tsunami Early Warning from Global Navigation Satellite System Data using Convolutional Neural Networks](#)” *Geophysical Research Letters*. 49(20).
9. **Robert Baraldi**, Aleksandr Aravkin, Dominique Orban (2021), “[A Proximal Quasi-Newton Trust-Region Method for Nonsmooth Regularized Optimization](#)”, *SIAM Journal of Optimization*. 32(2): 900-929.
8. Christopher Liu, Donsub Rim, **Robert Baraldi**, Randall LeVeque (2021), “[Comparison of Machine Learning Approaches for Tsunami Forecasting from Sparse Observations](#)”, *Pure and Applied Geophysics* 178, 5129-5153.
7. **Robert Baraldi**, Rajiv Kumar, Aleksandr Aravkin (2019), “[Basis Pursuit Denoise with Nonsmooth Constraints](#)”, *IEEE Transactions on Signal Processing* 67(22): 5811-5823.
6. **Robert Baraldi**, Carl Ulberg, Rajiv Kumar, Kenneth Creager, Aleksandr Aravkin (2019), “[Relaxation Algorithms for matrix completion, with applications to seismic travel-time data interpolation](#)”, *Inverse Problems* 35(10):105009.
5. Harvey Thomas Banks, **Robert Baraldi**, Jared Catenacci, Nicholas Myers (2016), “[Parameter Estimation Using Unidentified Individual Data in Individual Based Models](#)”. *Mathematical Modeling of Natural Phenomena* 11(6):103-121.
4. Harvey Thomas Banks, **Robert Baraldi**, Kevin Flores, Michael Stemkovski (2016), “[Validation of a](#)

*Note that Sandia National Laboratories' Review and Approval process may prevent some of this work from being publically available on ArXiv until cleared. This in-review but not cleared work will be denoted via *.

Mathematical Model for Green Algae (*Raphidocelis subcapitata*) Growth and Implications for a Coupled Dynamical System with *Daphnia Magna*", *Applied Sciences* 6(5): 155.

3. Kaska Adoteye, Harvey Thomas Banks, **Robert Baraldi**, John Nardini, W Clay Thompson (2015), "Correlation of Parameter Estimators for Models Admitting Multiple Parametrizations", *International Journal of Pure and Applied Mathematics* 105(3): 497-522.
2. Harvey Thomas Banks, **Robert Baraldi**, Kevin Flores (2015), "Optimal Design for Minimizing Uncertainty in Dynamic Equilibrium Systems", *Eurasian Journal of Mathematical and Computer Applications* 3: 20-43.
1. Harvey Thomas Banks, **Robert Baraldi**, Karissa Cross, Christina McChesney, Laura Poag, Emma Thorpe, Kevin Flores (2015), "Uncertainty quantification in modeling HIV viral mechanics.", *Mathematical Biosciences and Engineering* 12(5): 937-964.

Book Chapters

1. Robert Baraldi, Drew Kouri, Denis Ridzal (2023), "Trust-Region Methods with Inexact and Adaptive Computations", *Encyclopedia of Optimization*.

Conference Proceedings

2. **Robert Baraldi**, Evelyn Herberg, Drew P. Kouri, Harbir Antil (2023), "Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization", *Proceedings of the International Model Analysis Conference XLI: Model Validation and Uncertainty Quantification*, #14609.
1. **Robert Baraldi**, Karissa Cross, Christina McChesney, Laura Poag, Emma Thorpe, Kevin Flores, Harvey Thomas Banks (2014) [Uncertainty quantification for a model of HIV-1 patient response to antiretroviral therapy interruptions](#). *Proceedings of the 2014 American Control Conference*, 2753-2758.

Conference Presentations and Talks

30. **Robert Baraldi** (2025), "An Adaptive Inexact Trust-Region Method for PDE-Constrained Optimization with Regularized Objectives", PNWS-SIAM 2025, October 3-5, Seattle.
29. Harbir Antil, **Robert Baraldi**, Rohit Khandelwal, Drew P. Kouri (2025), "An Adaptive Finite Element Trust-Region Method for Regularized PDE-Constrained Optimization", ICCOPT 2025, July 20-24, Los Angeles.
28. Robert Baraldi, Michael Hintermüller, Drew P. Kouri (2025), "Optimization of Total Variation-Regularized Functions using Inexact Proximal Solves", The 30th Biennial Numerical Analysis Conference, June 24-27, Glasgow.
27. Harbir Antil, Robert Baraldi, Rohit Khandelwal, Drew P. Kouri (2025), "An Adaptive Finite Element Trust-Region Method for Regularized PDE-Constrained Optimization", East Coast Optimization Meeting, April 17-18, Washington DC.
26. Robert Baraldi (2025), "A Nonsmooth Trust-Region Framework for Applications in Data Science and PDE Constrained Optimization", Simon Fraser University MOCAD Seminar, March 10, Vancouver, Canada.
25. Robert Baraldi, Michael Hintermüller, Drew P. Kouri (2025), "Optimization of Total Variation-Regularized Functions using Inexact Proximal Solves", SIAM CSE, March 3-7, Ft. Worth, TX.
24. Harbir Antil, Robert Baraldi, Drew P. Kouri (2024), "Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization", INFORMS24, October 19-23, Seattle, WA.
23. **Robert Baraldi**, Drew P. Kouri (2024), "A Proximal Trust-Region Method for Nonsmooth Optimization with Inexact Function and Gradient Evaluations", WCOM24, September 21, Vancouver, Canada.

22. **Robert Baraldi**, Drew P. Kouri, Harbir Antil (2024), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, ISMP24, July 21-26, Montréal, Canada.
21. **Robert Baraldi**, Drew P. Kouri, Harbir Antil (2024), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, PASC24, June 3-5, Zurich, Switzerland.
20. **Robert Baraldi**, Aurya Javeed, Drew Kour, Christian Glusa, Kim Liegeois (2024), “Training Neural Networks with PyROL: Algorithms and Examples”, Copper Mountain Iterative Methods, April 14-19, Copper Mountain Co.
19. **Robert Baraldi**, Drew P. Kouri, Harbir Antil (2024), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, SIAM UQ, February 29 - March 1, Trieste, Italy.
18. **Robert Baraldi**, Drew P. Kouri (2024), “A Proximal Trust-Region Method for Nonsmooth Optimization with Inexact Function and Gradient Evaluations”, Dept. of Mathematics Seminar, February 24, TU Dortmund, Germany.
17. **Robert Baraldi**, Drew P. Kouri (2023), “A Proximal Trust-Region Method for Nonsmooth Optimization with Inexact Function and Gradient Evaluations”, Applied Inverse Problems, September 4, Göttingen, Germany.
16. **Robert Baraldi**, Drew P. Kouri (2023), “A Proximal Trust-Region Method for Nonsmooth Optimization with Inexact Function and Gradient Evaluations”, WIAS Research Seminar on Mathematical Optimization Nonsmooth Variational Problems and Operator Equations, August 29, Berlin, Germany.
15. **Robert Baraldi**, Evelyn Herberg, Harbir Antil, Drew P. Kouri (2023), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, SIOPT, May 31 - June 4, Seattle, WA.
14. **Robert Baraldi**, Drew P. Kouri (2023), “Efficient Proximal Subproblem Solvers for an Inexact Nonsmooth Trust-Region Method”, SIAM CSE, February 28 - March 4, Amsterdam, ND.
13. **Robert Baraldi**, Drew P. Kouri (2023), “An Inexact Trust-Region Algorithm for Nonsmooth Nonconvex Regularized Problems”, Bayreuth Applied Mathematics Seminar, February 24, Bayreuth, Germany.
12. **Robert Baraldi**, Evelyn Herberg, Harbir Antil, Drew P. Kouri (2023), “Adaptive Randomized Sketching for Dynamic Nonsmooth Optimization”, IMAX XLI, February 15, Austin, TX.
11. **Robert Baraldi**, Drew P. Kouri (2022), “An Inexact Trust-Region Algorithm for Nonsmooth Nonconvex Regularized Problems”, Centre de recherches mathématiques Seminar at McGill, October 24, Quebec.
10. **Robert Baraldi**, Drew P. Kouri (2022), “An Inexact Trust-Region Algorithm for Nonsmooth Nonconvex Regularized Problems”, GERAD Seminar, October 20, Polytechnique Montréal, Quebec.
9. **Robert Baraldi**, Drew P. Kouri (2022), “An Inexact Trust-Region Algorithm for Nonsmooth Nonconvex Regularized Problems”, Center for Mathematics and Artificial Intelligence Colloquium, September 30 (Virtual).
8. **Robert Baraldi**, Stefan Wild, Sven Lyeffer (2022), “Using Filter Methods to Guide Convergence for ADMM, with Applications to Nonnegative Matrix Factorization Problems”, ICCOPT/MOPTA 2022, July 25-28. Bethlehem, PA.
7. **Robert Baraldi**, Aleksandr Aravkin, Dominique Orban (2021), “A Proximal Quasi-Newton Trust-Region Method for Nonsmooth Regularized Optimization”, SIOPT 2021 (virtual), July 22.
6. **Robert Baraldi**, Stefan Wild, Sven Lyeffer (2020), “Using Filter Methods to Guide Convergence for ADMM, with Applications to Nonnegative Matrix Factorization Problems”, SIAM CSE 2021, (Virtual).
5. **Robert Baraldi** (2020), “Moreau-Yoshida Regularization and First Order Methods with Firedrake”, Firedrake 2020, Seattle, WA; February 22.
4. **Robert Baraldi** (2020), “Basis Pursuit Denoise with Nonsmooth Constraints”, DOE CSGF Annual Program Review, Arlington, VA; July 14-18.
3. **Robert Baraldi** (2019), “An Acceleration Framework for Parameter Estimation using Implicit Sampling and Adaptive Reduced order Models”, SIAM CSE, Spokane WA; 2/25-3/1.
2. **Robert Baraldi** (2019), “Relaxation Algorithms for matrix completion, with applications to seismic travel-time data interpolation”, DOE CSGF Annual Program Review, Arlington, VA; July 15-19.
1. **Robert Baraldi** (2016), “Systems Modeling and Data Assimilation in Drug Development”, SIAM Annual Life Sciences Conference, Boston, MA; July 11-15.

Technical Reports (Not peer-reviewed)

2. **Robert Baraldi**, John Nardini, Emma Thorpe, and Harvey Thomas Banks (2014) [The Effects of Parameterization on Inverse Problems](#), CRSC Technical report CRSC-TR14-07, Raleigh, NC.
 1. **Robert Baraldi**, Karissa Cross, Christina McChesney, Laura Poag, Emma Thorpe, Kevin Flores, and Harvey Thomas Banks (2013) [“Mathematical Modeling of HCV Viral Kinetics”](#). CRSC Technical report CRSC-TR13-07, Raleigh, NC.
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Open-Source Code

[Rapid Optimization Library](#).

[RegularizedOptimization](#) (part of [JuliaSmoothOptimizers](#)).

[ShiftedProximalOperators](#) (part of [JuliaSmoothOptimizers](#)).

[RegularizedProblems](#) (part of [JuliaSmoothOptimizers](#)).