

Richard J. Clancy

www.rjclancy.com

EDUCATION

- **Ph.D. in Applied Mathematics** Boulder, CO
University of Colorado *Aug 2017 – May 2022 (expected)*
- **M.S. in Applied Mathematics** San Marcos, TX
Texas State University *Aug 2015 – May 2017*
- **B.A. in Physics** Boulder, CO
University of Colorado *Aug 2003 – May 2007*

PAPERS AND MANUSCRIPTS

- **Clancy, R.J.**, Menickelly, M., Hückelheim, J., Hovland, P., Nalluri, P., Gjini, R., 2022. “[TROPHY: trust region optimization using a precision hierarchy](#)”. arXiv:2202.08387. (submitted to *ICCS 2022*).
- **Clancy, R.J.**, Becker, S., 2021. “[Approximate maximum likelihood estimators for linear regression with design matrix uncertainty](#)”. arXiv preprint arXiv:2104.03307. (submitted to *IEEE Transactions on Signal Processing*).
- **Clancy, R.J.**, Gerginov, V., Alem, O., Becker, S. and Knappe, S., 2021. “[A study of scalar optically-pumped magnetometers for use in magnetoencephalography without shielding](#)”. *Physics in Medicine & Biology*, 66(17), p.175030.
- Becker, S. and **Clancy, R.J.**, 2020. “[Robust least squares for quantized data matrices](#)”. *Signal Processing*, 176, p.107711.
- **Clancy, R.J.**, 2017. “[Numerical solutions to Poisson’s Equation over non-uniform discretizations with associated fast solvers](#)”. *M.S. Thesis*.

PRESENTATIONS

- “Assorted topics in applied mathematics”, *Institute for Human Neuroscience Seminar*, Boys Town Research Hospital, Dec 2021, Omaha, NE.
- “TROPHY: A variable precision trust region method”, *SASSY Seminar*, Argonne National Laboratory, Jul 2021, Lemont, IL (remote).
- “Design matrix uncertainty: robust optimization and approximate MLE approaches” *SIAM Conference in Optimization*, Jul 2021, Spokane, WA (remote).
- “Approximate maximum likelihood estimators for regression with design matrix uncertainty” *SIAM FRAMSC*, Mar 2021, Denver, CO (remote).
- “Optimal convergence of the Shortley-Weller Formula for Poisson’s Equation over an interior non-uniform grid”. *Differential Equation and Applied Math Seminar*, May 2017, Texas State University, San Marcos, TX.

EXPERIENCE

- **University of Colorado** Boulder, CO
Research/Teaching Assistant *Aug 2017 – Present*
 - **Numerical Optimization:** Designed an interpolation based trust region algorithm for numerical optimization that employs function and derivative information to accelerate convergence.
 - **Robust Optimization:** Formulated and solved min/max optimization problems ensuring solutions to least squares problem were robust to noise.
 - **Maximum Likelihood Estimation for Regression:** Devised an approximation method using probability theory and complex analysis to solve otherwise intractable linear regression problems when the data in design matrix is uncertain.
 - **Inverse Problems and Signal Processing:** Developed algorithms to solve inverse problems for localizing regions of brain activity. Wrote software to extract signals of interest using Fourier transforms, independent component analysis, principal component analysis, etc.
 - **Teaching:** Linear Algebra, Differential Equations, Markov Processes, Multivariate Calculus.
- **Los Alamos National Laboratory** Los Alamos, NM (remote)
Research Intern *Jul 2021 – Sep 2021*
 - **High Performance Computing:** Investigated likelihood of (and remedial actions for) catastrophic rounding error in scientific computing pipelines. Discovered that 20% of computations in a partial differential equation simulation were ignored due to limited dynamic range of floating point arithmetic when using single precision.
- **Argonne National Laboratory** Lemont, IL (remote)
Givens Associate *May 2021 – Jul 2021*
 - **Optimization for Big Data:** Implemented and analyzed trust region algorithm that used different floating precision levels to reduce computational load.
 - **Numerical Linear Algebra:** Employed limited memory linear algebra routines allowing for the solution of massive climate modeling problems with millions of variables.
- **FieldLine, Inc** Boulder, CO
Research Intern *May 2020 – Aug 2020*
 - **Physics Based Modeling:** Wrote code to model physical phenomena used in the solution of inverse problems for border security applications.
 - **Simulations:** Simulated different sensor array geometries to determine optimal configurations for counter-tunneling applications eliminating need for costly physical experiments.
- **Sensory, Inc** Boulder, CO
Research Intern *May 2019 – Aug 2019*
 - **Computer Vision:** Investigated methods for estimating facial pose angle and absolute distance from camera for facial authentication and user engagement.
 - **Data Visualization:** Wrote software to parse, analyze, and visualize large messy data sets.

- **Texas State University** San Marcos, TX
Research/Teaching Assistant *Aug 2015 – May 2017*
 - **Numerical Partial Differential Equations and Fast Solvers:** Studied numerical methods for solving partial differential equations with a focus on error analysis. Developed and implemented multi-grid solvers.
 - **Teaching:** Calculus and Developmental Mathematics.
- **AAA Capital Management Advisors, LTD** Houston/Austin, TX
Quantitative Analyst / Natural Gas Options Trader *Jul 2007 – Sep 2014*
 - **Research and Trading:** Conducted fundamental and quantitative research at energy focused commodity trading advisor. Managed \$25 million option portfolio.
 - **Software:** Assisted in the development of a proprietary risk-management system that evaluated derivative option risks in real-time.
 - **Monte Carlo Simulations:** Built economic models and ran Monte Carlo simulations to stress test option exposure.

COMPUTATIONAL SKILLS

- **Programming languages:** Python, MATLAB, C++, Visual Basic for Applications, R.
- **Libraries::** NumPy, SciPy, Pandas, JAX, Scikit-learn, and Matplotlib, OpenCV.
- **Other technologies:** Linux/Unix Command Line, Parallel Computing, Git, SQL, Microsoft Office.
- **Relevant courses:** Machine learning, Numerical linear algebra, Numerical analysis/methods, Algorithms, Convex optimization, Mathematical statistics, Regression analysis, Scientific computing.

SERVICE

- **President:** SIAM Graduate Student Chapter at CU-Boulder, May 2020 – Aug 2021.
- **Organizer:** SIAM Front Range Student Conference, Mar 2021.
- **Reviewer:** ICML 2021, NeurIPS 2021, ICLR 2022.
- **Mentor:** First year Graduate School Mentorship Program, CU-Boulder, Aug 2018 – Present.
- **Volunteer Teacher:** Summer STEM Camp for Machine Learning, Jul 2018 and Jul 2019