

Victor Churchill

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Hanover, NH

EDUCATION **Guarini School of Graduate and Advanced Studies, Dartmouth College**

Ph.D., Mathematics, Jun. 2020 (expected)
A.M., Mathematics, Nov. 2017
Advisor: Anne Gelb

Courant Institute of Mathematical Sciences, New York University

M.S., Mathematics, 2016
Thesis: Fast multipole methods for axisymmetric geometries
Advisor: Michael O'Neil

Boston College

B.A., Mathematics, 2013, *magna cum laude*, minor in economics

RESEARCH EXPERIENCE

Dartmouth College Hanover, NH – Fall 2017 : Spring 2020

- As a Ph.D. student, conducted fundamental mathematical and computational research in the field of inverse problems in signal and image processing.
- Working under Prof. Anne Gelb, specific research topics included synthetic aperture radar image formation, compressed sensing, algorithm development for edge detection and image reconstruction, and Bayesian learning methods.

Cold Regions Research and Engineering Laboratory Hanover, NH – Summer 2019

- As a student researcher, conducted fundamental applied mathematics research to identify cracks in sea ice from sparse displacement measurements.
- Working under Drs. Matthew Parno, Devin O'Connor, and Andrew Davis, specific research topics included PDE-constrained optimization, computational mechanics models, and the relationship between regularization and energy minimization in inverse problems.

ATR Center at Wright State University Dayton, Ohio – Summer 2018

- As a student researcher working under Drs. Theresa Scarnati and Ed Zelnio, conducted fundamental research on 3D interferometric synthetic aperture radar image formation.

PUBLISHED PAPERS

1. CHURCHILL, V. AND GELB, A.
Detecting edges from non-uniform Fourier data via sparse Bayesian learning,
Journal of Scientific Computing, (2019).
2. CHURCHILL, V., ARCHIBALD, R., AND GELB, A.
Edge-adaptive ℓ_2 regularization image reconstruction from non-uniform Fourier data.
Inverse Problems and Imaging, (2019).
3. CHURCHILL, V. AND GELB, A.
Edge-masked CT image reconstruction from limited data,
Proc. SPIE 11072, 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine, 110721V (28 May 2019);
doi: 10.1117/12.2534436; <https://doi.org/10.1117/12.2534436>

AWARDS

2020 SIAM Student Travel Award for SIAM Conference on Uncertainty Quantification
2019 Neukom Prize for Outstanding Graduate Research in Computational Science - 2nd Place
2019 Neukom Institute for Computational Science Travel Grant
2018 SIAM Student Travel Award for SIAM Conference on Imaging Science
2016-2021 Dartmouth Fellowship
2013 Pi Mu Epsilon National Mathematics Honor Society
2011-2012 National Security Education Program David L. Boren Scholarship

OTHER PAPERS
IN PREPARATION

1. CHURCHILL, V. AND GELB, A.
Estimation and uncertainty quantification for piecewise smooth signal recovery.
Submitted to Journal of Scientific Computing 3/2/20.
2. CHURCHILL, V., PARNO, M., O'CONNOR, D., DAVIS, A., AND POLASHENSKI, C.
Identifying cracks in sea ice from sparse laser strain measurements.
3. CHURCHILL, V. AND GELB, A.
Image reconstruction enhancement via masked regularization.
arXiv preprint arXiv:1902.00092 (2018). <https://arxiv.org/abs/1902.00092>.
4. CHURCHILL, V. AND GELB, A.
Total variation Bayesian learning via synthesis.
arXiv preprint arXiv:1905.01199 (2019). <https://arxiv.org/abs/1905.01199>.
5. CHURCHILL, V.
Use of convexity in contour detection.
arXiv preprint arXiv:1905.01199 (2019). <https://arxiv.org/abs/1905.01199>.

TALKS

- Jul. 2020 SIAM Conference on Imaging Science (invited)
Binary weighting for sparsity regularization
- Apr. 2020 UMass Lowell Applied Mathematics Seminar (invited)
Binary weighting for sparsity regularization
- Jan. 2020 AFOSR Contractor Review (invited)
High order total variation Bayesian learning via synthesis
- Dec. 2019 The Ohio State University Computational Mathematics Seminar (invited)
High order total variation Bayesian learning via synthesis
- Oct. 2019 SIAM PNW Regional Meeting
Image reconstruction via masked regularization
- Oct. 2019 Dartmouth Applied and Computational Math Seminar
Identifying damage in sea ice from sparse laser strain measurements
- Sep. 2019 SIAM SEAS Regional Meeting
Image reconstruction via masked regularization
- May 2019 Dartmouth Applied and Computational Math Seminar
Total variation Bayesian learning via synthesis
- Apr. 2019 New England Numerical Analysis Days
Image reconstruction via masked regularization
- Aug 2018 ATR Center Summer Review
Sparsity-based Interferometric Synthetic Aperture Radar
- Jun. 2018 SIAM Conference on Imaging Science
Edge-Adaptive ℓ_2 Regularization Image Reconstruction

POSTERS

- Jun. 2019 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine
Edge-masked CT image reconstruction from limited data
- Apr. 2019 Graduate Student Poster Session - Dartmouth College
Image reconstruction enhancement via masked regularization
- Mar. 2019 Computational Imaging - ICERM
Image reconstruction enhancement via masked regularization
- Oct. 2018 Celebrating Biomedical Research at Dartmouth College
Parameter-free Bayesian Total Variation Medical Image Denoising
- Aug 2018 ATR Center Summer Review
Sparsity-based 3D Interferometric Synthetic Aperture Radar
- Apr. 2018 Graduate Student Poster Session - Dartmouth College
Edge-Adaptive ℓ_2 Regularization Image Reconstruction
- Jan. 2018 Annual Review of EM Contractors - Air Force Office of Scientific Research
Edge-Adaptive ℓ_2 Regularization Image Reconstruction from Vehicle SAR Data

PROFESSIONAL
DEVELOPMENT

- Fall 2019 Academic Job Search Workshop Series (10 sessions)
Dartmouth Center for the Advancement of Learning
- Winter 2019 Future Faculty Teaching Workshop Series (6 sessions)
Dartmouth Center for the Advancement of Learning

AFFILIATIONS 2018-2020 Vice President, Dartmouth SIAM Chapter
2017-2020 Representative, Dartmouth Graduate Student Council
2016- Member, SIAM

CODING Python, MATLAB

INDUSTRY WORK 2014-2015 Program Manager, Code Systems Corporation

TEACHING **Dartmouth**

- Instructor of Record, Math 8 – Calculus of Functions of One and Several Vars., Spring 2020
 - Designed and delivered lectures, held office hours, wrote homework and exams.
- Instructor of Record, Math 23 – Differential Equations, Fall 2019
 - Designed and delivered lectures, held office hours, wrote homework and exams.
- Workshop Leader, Johns Hopkins - Center for Talented Youth, May 2018
 - Organized a workshop for middle and high school students on PageRank, the Google search result ranking algorithm.
- Teaching Assistant, Math 22 – Linear Algebra, Spring 2018
 - Held homework help sessions three times a week.
- Teaching/Research Assistant, Dartmouth Mathematics REU, Summer 2017
 - Wrote and graded homework, held coding tutorials, and assisted students with individual research projects.
- Teaching/Research Assistant, Math 76 – Topics in Applied Math, Summer 2017
 - Wrote and graded homework, held coding tutorials, and assisted students with individual research projects.
- Teaching Assistant, Math 20 – Probability, Spring 2017
 - Held homework help sessions three times a week.
- Teaching Assistant, Math 23 – Differential Equations, Fall 2016
 - Held homework help sessions three times a week.

Courant

- Recitation Leader, Algebra and Calculus, Fall 2015 and Spring 2016
 - Instructed students in twice weekly mandatory review sessions, wrote and graded quizzes.