

Chao Wang

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Southern University of Science and Technology,
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Employment & Experience

Southern University of Science and Technology	Guangdong, China
• Assistant Professor at Dept. Statistic & Data Science	Sep. 2021 - Present
University of California, Davis	California, USA
• Postdoctoral Researcher at TETRAPODS Institute of Data Science	Jul. 2020 - Present
Advisors: Prof. Chen-Nee Chuah & Prof. Nina Amenta	
University of Texas (UT) Southwestern Medical Center & UT Dallas	Texas, USA
• Postdoctoral Researcher at Medical Artificial Intelligence and Automation Lab	Oct. 2018 - Jun. 2020
Advisors: Prof. Xun Jia & Prof. Yifei Lou	

Education

The Chinese University of Hong Kong	Hong Kong
• Ph.D. in Mathematics (GPA: 3.92/4.00)	2015 - 2018
Advisor: Prof. Raymond H. Chan	
Dissertation: Sparse Recovery Algorithms for 3D Imaging Using Point Spread Function Engineering	
Shantou University	Shantou, China
• M.Sc. in Applied Mathematics (GPA: 3.84/4.00)	2012 - 2015
Advisor: Prof. Fu-Rong Lin	
Thesis: Research on Regularization Parameter Selection Methods in Inverse Problems	
Hanshan Normal University	Chaozhou, China
• B.Sc. in Mathematics (GPA: 3.78/4.00)	2008 - 2012

Research Interests

Scientific Computing, Image Processing, Interdisciplinary Mathematical Modeling, Compressed Sensing, Convex and Nonconvex Optimization, Hyperspectral Imaging, Tensor Computation, Deep Learning, Numerical Linear Algebra

Grants

Investigator, NSFC (300,000 RMB)	2023-2025
• The Study of Point Spread Function-based Deep Learning Models and Algorithms for Three-dimensional Point Source Localization	
Investigator, Guangdong Basic and Applied Basic Research Foundation (150,000 RMB)	2024-2026
• The Study of Single-lobe Point Spread Function-based approach for Three-dimensional Point Source Localization and Tracking	
Investigator, Shenzhen Science and Technology Program (500,000 RMB)	2023-2025
• Tensor Reconstruction Models and Algorithms in Brain Imaging	
Co-Investigator, Shenzhen Fundamental Research Program (1,500,000 RMB)	2023-2026
• Algorithms Study on Early Diagnosis Systems for Neurodegenerative Disease	
Co-Investigator, HKRGC Grant (600,000 HKD)	2021 - 2023
• Novel Computational Methods for 3D Point Source Localization based on Point Spread Function Analytics	

Core-member, National Key R&D Program of China (12,000,000 RMB)

2024-2026

- The Mathematical Issues and Their Applications in the Construction and Analysis of Brain Dynamic Imaging

Publications

Preprint (* indicates corresponding author, # indicates co-first author)

- [1] GB. Rehm, **C. Wang**, I. Cortes-Puch, CN. Chuah, J. Adams. "Deep learning-based detection of the acute respiratory distress syndrome: what are the models learning?" arXiv preprint arXiv:2109.12323
- [2] **C. Wang***, M. Yan, J. Yu. "Sorted L1/L2 Minimization for Sparse Signal Recovery" arXiv preprint arXiv:2308.04125
- [3] **C. Wang**, JF. Aujol, G. Gilboa, Y. Lou.* "Minimizing quotient regularization model" arXiv preprint arXiv:2308.04095
- [4] J. Zhang, L. Zhu, **C. Wang**, S. Li*. "Hyperspectral image fusion via logarithmic low-rank tensor ring decomposition". arXiv preprint arXiv:2310.10044

Accepted/ Published

- [5] H. Zheng, Y. Lou, G. Tian, **C. Wang***. "A scale-invariant relaxation in low-rank tensor recovery with an application to tensor completion". *SIAM Journal on Imaging Sciences* (to appear)
- [6] T. Wang, J. Li, M. Ng, **C. Wang***. "Nonnegative matrix functional factorization for hyperspectral unmixing with non-uniform spectral sampling". *IEEE Transactions on Geoscience and Remote Sensing* 62, 1-13, 2024.
- [7] T. Wang, X. Wu, J. Li*, **C. Wang***. "Robust retrieval of material chemical states in X-ray microspectroscopy". *Optics Express*, 31(25), 42524-42538, 2023.
- [8] L. Dai, M. Lu, **C. Wang***, S. Prasad, R. Chan*. "LocNet: Deep Learning-based Localization on Rotating Point Spread Function with Applications to Telescope Imaging". *Optics Express*, 31(24), 39341-39355, 2023.
- [9] J. Zhang, J. Lu, **C. Wang**, S. Li*. "Hyperspectral and multispectral image fusion via superpixel-based weighted nuclear norm minimization". *IEEE Transactions on Geoscience and Remote Sensing*. 5521612. 2023.
- [10] J. Yang, M. Ma, J. Zhang, **C. Wang***. "Noise removal using an adaptive Euler's elastica-based model." *the Visual Computing*. 1-12. 2022
- [11] Z. Lai, **C. Wang#**, H. Gunawan, SC. Cheung, CN. Chuah. "Smoothed adaptive weighting for imbalanced semi-supervised learning: improve reliability against unknown distribution." *The International Conference on Machine Learning (ICML)*. 2022.
- [12] D. Sprouts, Y. Gao, **C. Wang**, X. Jia, C. Shen, Y. Chi "The development of a deep reinforcement learning network for dose-volume-constrained treatment planning in prostate cancer intensity modulated radiotherapy" *Biomedical Physics & Engineering Express*. 8 (4), 045008, 2022.
<https://doi.org/10.1088/2057-1976/ac6d82>
- [13] Z. Lai, **C. Wang#**, SC. Cheung, CN. Chuah. "SaR: Self-adaptive refinement on pseudo labels for multiclass-imbalanced semi-supervised learning" *The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) workshop*, pp. 4091-4100, 2022.
- [14] **C. Wang**, M. Tao, CN. Chuah, J. Nagy, and Y. Lou*. "Minimizing L_1 over L_2 norms on the gradient." *Inverse Problems*. 39 065011, 2022.
- [15] **C. Wang**, H. Jung, M. Yang, C. Shen, X. Jia*, "Simultaneous image reconstruction and element decomposition for iodine contrast agent visualization in multi-energy element-resolved cone beam CT", *Frontiers in Oncology*, 113, 2022.

- [16] Z. Lai*, **C. Wang**#, L. Oliveira, B. Dugger, SC. Cheung, CN. Chuah, "Joint semi-supervised and active learning for segmentation of gigapixel pathology images with cost-effective labeling," *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 591-600, 2021.
- [17] Z. Lai, **C. Wang**, Z. Hu, B. Dugger, SC. Cheung, CN. Chuah*, "A semi-supervised learning for segmentation of gigapixel histopathology images from brain tissues", accepted by International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC).
- [18] **C. Wang***, M. Tao, J. Nagy, and Y. Lou. "Limited-angle CT reconstruction via the L_1/L_2 minimization." *SIAM Journal on Imaging Sciences*. 14(2), 749–777, 2021.
- [19] **C. Wang**, Y. Gonzalez, C. Shen, B. Hrycushko, and X. Jia*. "Simultaneous needle catheter selection and dwell time optimization for Preplanning of HDR Brachytherapy of Prostate Cancer", *Physics in Medicine & Biology*, (66), 055028, 2021.
- [20] **C. Wang**, M. Yan, and Y. Lou*. "Accelerated schemes for the L_1/L_2 minimization." *IEEE Transaction on Signal Processing*, 68, 2660 - 2669, 2020.
- [21] **C. Wang**, Y. Gonzalez, C. Shen, and X. Jia* "Simultaneous needle selection and dwell time optimization in prostate cancer high-dose-rate brachytherapy." *Medical Physics* 47 (6), E367-E367, 2020.
- [22] Y. Huang, Y. Zhong, **C. Wang**, Y. Gonzalez, C. Shen, and X. Jia*. "Comprehensive calibration and evaluation of a cone-beam CT on a pre-clinical small animal radiation research platform", *Medical Physics* 47 (6), E731-E731, 2020.
- [23] Y. Rahimi, **C. Wang***, H. Dong, and Y. Lou. "A scale invariant approach for sparse signal recovery." *SIAM Journal on Scientific Computing*, 41(6), A3649–A3672, 2019.
- [24] **C. Wang***, G. Ballard, R.J. Plemmons, and S. Prasad "Joint 3D localization and classification of space debris using a multispectral rotating point spread function." *Applied Optics*, 58, 8598-8611, 2019.
- [25] **C. Wang***, R.H. Chan, M. Nikolova, R.J. Plemmons, and S. Prasad. "Non-convex optimization for 3-dimensional point source localization using a rotating point spread function." *SIAM Journal on Imaging Sciences*, 12(1):259–286, 2019.
- [26] **C. Wang***, R.J. Plemmons, S. Prasad, R.H. Chan, and M. Nikolova. "Novel sparse recovery algorithms for 3D debris localization using rotating point spread function imagery." In *Proc. 2018 AMOS Technical Conference*, Maui, HI. 2018.
- [27] **C. Wang***, R.H. Chan, R.J. Plemmons, and S. Prasad, "Point spread function engineering for 3D imaging using a continuous exact L_0 penalty (CELO) based algorithm." *International Workshop On Image Processing and Inverse Problems*. 1-12, 2018.
- [28] X. Fang, F. Lin, and **C. Wang***. "Estimation of a regularization parameter for a robin inverse problem." *East Asian Journal on Applied Mathematics*, 7(2) 325-342, 2017.

Honors & Awards

• SIAM Early Career Travel Grant Award	2020
2020 SIAM Conference on Imaging Science (IS20)	
• SIAM Student Travel Grant Award	2018
2018 SIAM Conference on Imaging Science (IS18)	
• SIAM Student Chapter Certificate of Recognition	2018
• Best Poster Presentation Award	2017
4th AoE Symposium on Organelle Biogenesis and Function	
• Best Student Paper Award	2017
Annual Meeting of China Society for Industrial and Applied Mathematics	
• CUHK Postgraduate Studentship	2015 - 2018
• Second Prize of the National Post-Graduate Mathematic Contest in Modeling	2013



- **Outstanding Graduate Student Award** at Shantou University 2013
- **Second Prize of the National Mathematics Contest**, Guangdong Division (Rank 16th) 2011
- **National Endeavor Scholarship** 2009 - 2010

Teaching

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| Southern University of Science and Technology | Shenzhen, China |
| <ul style="list-style-type: none"> • Instructor, Department of Statistics and Data Science 2022 – Present <ul style="list-style-type: none"> • STA201 Operational Research and Optimization, 2022- Present • STA5013 Statistical & Mathematical Image Processing, Fall 2023 | |
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|--|------------------|
| The Chinese University of Hong Kong | Hong Kong |
| <ul style="list-style-type: none"> • Teaching Assistant, Department of Mathematics 2015 - 2018 <ul style="list-style-type: none"> • MATH4230 Optimization Theory, Spring 2018 • MATH3215A Operations Research, Fall 2017 • MATH2221 Mathematical Laboratory, Spring 2017 • MATH3215 Operations Research, Spring 2017 • MATH2010 Advanced Calculus I, Spring 2016 • MATH3210 Linear Programming, Fall 2015 | |
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|---|-----------------------|
| Shantou University | Shantou, China |
| <ul style="list-style-type: none"> • Teaching Assistant, Department of Mathematics 2013 <ul style="list-style-type: none"> • MAT1002B Linear Algebra and Analytic Geometry, Fall 2013 | |

Professional Activities

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| Co-Editor | 2023 |
| Special Issue: Multiple Sensors Fusion for Image Recognition | |
| Journal: Sensors | |
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| Referee Service | 2019 - Present |
| <ul style="list-style-type: none"> • SIAM Journal on Imaging Sciences • IEEE Transactions on Signal Processing • IEEE Transactions on Geoscience and Remote Sensing (TGRS) • Optics Express • IEEE Internet of Things Journal • Inverse Problems and Imaging (IPI) • TEST, Springer • Journal of Mathematical Imaging and Vision • Journal of Scientific Computing (JSC) • Journal of Microscopy • Machine Learning | <ul style="list-style-type: none"> • Research in the Mathematical Sciences (RMSB) • Calcolo • CVPR • Infrared Physics and Technology • Advances in Computational Mathematics • Frontiers • Computational and Applied Mathematics • Signal Processing • Journal of Computational and Applied Mathematics • Journal of Nonlinear and Variational Analysis |
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| Conference Organization | |
| • Min-symposium in International Congress on Industrial and Applied Mathematics (ICIAM) | Aug. 2023 |
| • Min-symposium in 2022 SIAM Conference on Imaging Science (IS22) | Mar. 2022 |
| • AI & Biomedical Imaging Workshop at UC Davis, online | Jan. - Mar. 2021 |
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| Mentorship (Ph.D. /MPhil /RA student project advisor) | 2018 - Present |
| <u>PhD students:</u> | |
| • Yunshan Li (SUSTech, Sept. 2023 - Present) | |

- Ting Wang (SUSTech, Sept. 2022 - Present)
- Huiwen Zheng (SUSTech, May 2022 - Present)
- Yaghoub Rahimi (UT Dallas, Oct. 2018 - Jun. 2019)
- Mujibur Chowdhury (UT Dallas, Oct. 2020 – Oct. 2021)
- Zhengfeng Lai (UC Davis, July. 2020 - July. 2022)
- Gregory Rehm (UC Davis, Jan. 2021 – Jul. 2021)

MPhil students:

- Zitian Ao (SUSTech, Sept. 2023 - Present)
- Xiaotong Wu (SUSTech, Sept. 2022 - Present)
- Junjie Yu (SUSTech, Sept. 2021 - Jun. 2023)
- Vishal Bhuvaneswari (UC Davis, Jan. 2021 – Jan. 2022)

RAs:

- Heyu Huang (SUSTech, May 2021 - Jan. 2022)
- Shengjie Niu (SUSTech, Jul. 2023 - Aug. 2023)

Undergraduate Students:

Simin Du, Jinsong Zhou, Yulun Wu,

Member of Shenzhen Health Economy Academy Health Statistic Committee 2021 - 2026

Student Chapter Representative Jul. 2017

- SIAM Chapter Meeting with SIAM Leadership at SIAM Annual Meeting in Pittsburgh, PA, USA

Research Exchange & Visiting

- Research Associate Aug. - Sep. 2018 & Jun. - Jul. 2017
 - Department of Computer Science Wake Forest University, USA
 - Advisor: Prof. Robert Plemmons
- Research Assistant Jun. 2015
 - Department of Mathematics at CUHK, Hong Kong
 - Advisor: Professor Raymond H. Chan
- Visiting Scholar 2013 - 2018
 - University of Bologna, Bologna, Italy (May - Jun. 2018)
 - Berlin Mathematical Society, Berlin, Germany (Jul. - Aug. 2016)
 - The Chinese Academy of Sciences, Beijing, China (Jul. - Aug. 2013)

Treasurer 2017-2018

- Student Chapter of SIAM, The Chinese University of Hong Kong

Presentations

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- SIAM Annual Meeting (AN24), Spokane, US Jul. 2024
 - SIAM Conference on Image Science (IS24), Atlanta, US May 2024
 - Workshop on Data Science and Scientific Computing, HKBU Dec. 2023
 - CSIAM Annual Meeting, Kuiming Oct. 2023
 - International Congress on Industrial and Applied Mathematics (ICIAM2023), Tokyo, Japan Aug. 2023
 - Invited Talk, Jiangxi Normal University, Nanchang, May 2023
 - Invited Talk, Nanchang Insitute of Technology, Nanchang May 2023

- Invited Talk, International Conference on Image Processing and Artificial Intelligence, Online, Dec. 2022
- Invited Talk, International Conference on Frontier of Statistics & Data Science, SUSTech Dec. 2022
- Invited Talk, CSIAM Annual Meeting, online Nov. 2022
- Invited Talk, Nanjing University, online Jun. 2022
- AI for Medical Imaging Workshop, Zhejiang Normal University, online May 2022
- SIAM Conference on Image Science (IS22), online Mar. 2022
- Invited Talk, Shenzhen Institute of Advanced Technology, Chinese Academy of Science Sept. 2021
- Invited Talk, Frontiers in Biomedical Imaging Seminar Series, UCD BME, online Nov. 2020
- Invited Talk, Machine Learning Working Group, UCD Health, online Oct. 2020
- Invited Talk, Mathematics of Data and Decisions at Davis, UCD Math, online Oct. 2020
- Joint AAPM & COMP Virtual Meeting, online Jul. 2020
- SIAM Conference on Image Science (IS20), online Jul. 2020
- SIAM Conference on Computational Science and Engineering (CSE19) , WA, USA Feb. 2019
- 2019 Georgia Scientific Computing Symposium, Georgia Institute of Technology, GA, USA Feb. 2019
- Scientific Computing Seminar, Emory University, GA, USA Feb. 2019
- Advanced Maui Optical and Space (AMOS) Surveillance Technologies Conference, HI, USA Sep. 2018
- Invited Talk, Wake Forest University, NC, USA Aug. 2018
- Invited Talk, Shantou University, Shantou, China Jul. 2018
- SIAM Conference on Image Science (IS18), Bologna, Italy Jun. 2018
- SIAM Conference on Applied Linear Algebra (ALA18), HKBU, HK May 2018
- International Workshop on Image Processing and Inverse Problems, CSRC, Beijing, China Apr. 2018
- 4th AoE Symposium on Organelle Biogenesis and Function, CUHK, Hong Kong Dec. 2017
- International Conf. & AoE Symposium on Organelle Biogenesis and Function, CUHK, HK Sep. 2017
- 15th Annual Meeting of China SIAM, Qingdao, China Oct. 2017
- 2017 Imaging Science Camp at SUST, Shenzhen, China Mar. 2017
- East Asian Section of SIAM Conference (EASIAM), Macau Jun. 2016
- 2014 Imaging Science Camp at SYSU, Guangzhou, China May 2014

Skills

Programming:

- MATLAB (Proficient), Python (Competent), Mathematica (Competent), C/C++ (Competent)

Software/API:

- TensorFlow, Keras, MS Office, LaTeX

Language:

- English (Fluent), Cantonese Chinese (Native), Mandarin Chinese (Fluent), Teochew Chinese (Native)