

# Rongrong Wang

## Address

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## EMPLOYMENT

**Michigan State University**, *Assistant Professor*  
Department of Computational Mathematics, Science and Engineering  
Department of Mathematics 2017-present  
**University of British Columbia**, *Postdoctoral Fellow*  
Department of Mathematics  
Department of Earth, Ocean and Atmospheric Sciences, Sep 2013- 2017  
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## EDUCATION

*PhD*, Applied Mathematics,  
University of Maryland College Park  
Advisor(s): John Benedetto, Wojciech Czaja. 2007-2013  
*BS*, Mathematics  
Peking University, China 2003-2007  
*BA*, Economics,  
Peking University, China 2004-2007

## RESEARCH INTERESTS

My research interests span various areas in applied harmonic analysis and computational mathematics including

- Compressed Sensing
- Sigma Delta quantization
- frame theory
- convex optimization, sparse signal recovery
- inverse problems.

## AWARDS

- Academic Excellence Award, University of Maryland, September 2007.
- Ruth Davis Award for outstanding academic accomplishments, University of Maryland, October 2009.

## PUBLICATIONS

Journal Papers

*Preprint/Submitted:*

1. Source estimation for wavefield-reconstruction inversion, with Z. Fang and F. Herrmann.

*Accepted/Appeared*

2. Sigma Delta quantization with Harmonic frames and partial Fourier ensembles, arXiv:1511.05671, accepted by Journal of Fourier Analysis and its Applications.
3. From compressed sensing to compressed bit-streams: practical encoders, tractable decoders, with R. Saab and Ö. Yilmaz, arXiv:1604.00700, to appear in IEEE Trans. Inf. Theory, 2017
4. Quantization of compressive samples with stable and robust recovery with R. Saab and Ö. Yilmaz. arXiv:1504.00087, to appear in Applied and Computational Harmonic Analysis, 2017.
5. The Gap Between the Null Space Property and the Restricted Isometry Property, with J. Cahill and X. Chen. arXiv:1506.03040, Linear Algebra Appl., 501, 363-375, 2016.
6. Restricted isometry property of random subdictionaries, with A. Barg and A. Mazumdar, IEEE Trans. Inf. Theory, 61(8), 4440-4450, 2015.
7. Measure of Scalability, with X. Chen, G. Kutyniok, K. Okoudjou, F. Philipp, IEEE Trans. Inf. Theory, 61(8), 4410-4423, 2015.
8. Singular Vector Perturbation under Gaussian Noise, SIAM. J. Matrix Anal. & Appl., 36(1), 158-177, 2015
9. A Null Space Analysis of the  $\ell_1$ -Synthesis Method in Dictionary-based Compressed Sensing With X. Chen and H. Wang, Applied and Computational Harmonic Analysis 37(3), 492-515, 2014.
10. Nonlinear Dimensionality Reduction via the ENH-LTSA Method for Hyperspectral Image Classification, with C. Liu, W. Sun, B. Shi, and W. Li, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 7(2), 375-388, 2014.
11. Small Fluctuations in Epitaxial Growth via Conservative Noise, with P. N. Patrone, and D. Margetis, Journal of Physics A: Mathematical and Theoretical, Vol. 44, art. 315002., 2011

#### Refereed conference proceedings

1. High-resolution fast microseismic source collocation and source time-function estimation, with S. Sharan, and F. J. Herrmann, SEG Technical Program Expanded Abstracts, 2017.
2. A denoising formulation of Full-Waveform Inversion, with F. J. Herrmann, SEG Technical Program Expanded Abstracts, 2017.
3. Frequency down-extrapolation with TV norm minimization, with F. J. Herrmann, SEG Technical Program Expanded Abstracts, 2016.
4. Sparsity-promoting joint microseismic source collocation and source-time function estimation, with S. Sharan, T. van Leeuwen and F. J. Herrmann, SEG Technical Program Expanded Abstracts, 2016.
5. A linearized Bregman method for compressive waveform inversion, with X. Chai, M. Yang, P. A. Witte, Z. Fang, and F. J. Herrmann, SEG Technical Program Expanded Abstracts, 2016.
6. Resolving Scaling Ambiguities with the  $\ell_1/\ell_2$  Norm in a Blind Deconvolution Problem with Feedback. with E. Esser, T. Lin, and F. Herrmann, IEEE International Workshop on Computational Advances in Multi-sensor Adaptive Processing 2015 (CAMSAP 2015).
7. Tightness of Stability Bounds by Null Space Property, with X. Chen, SPIE Optical Engineering+ Applications. International Society for Optics and Photonics, 2015.
8. A Lifted  $\ell_1/\ell_2$  Constraint for Sparse Blind Deconvolution, with E. Esser, T. Lin, and F. J. Herrmann, 77<sup>th</sup> EAGE, 2015.
9. Near-optimal Compression for Compressed Sensing, with R. Saab and Ö. Yilmaz, Data Compression Conference 2015 (DCC2015).
10. A Null Space Property Approach to Compressed Sensing with Frames, with X. Chen and H. Wang, 10th International Conference on Sampling Theory and Applications, 2013.

#### Thesis

- Global Geometric Conditions on Sensing Matrices for the Success of L1 Minimization Algorithm, 2013.

## TEACHING EXPERIENCE

- 2017 fall Differential Calculus MATH132, Michigan State University.
- 2014 fall Differential Calculus MATH100, University of British Columbia.
- 2012 summer Calculus II MATH141, University of Maryland.
- 2011 summer Calculus I MATH140, University of Maryland.
- 2009 spring Teaching assistant: Calculus I MATH130, University of Maryland.

## RESEARCH PROJECTS

- 2013-present Seismic image inversion, supported by Seismic Imaging by Next-Generation Basis Functions Decomposition (SINBAD).
- 2011-2013 Audio signal classification, supported by the Laboratory of Telecommunication Sciences (LTS).
- 2010-2011 Classification of Synthetic Aperture Sonar data, supported by the Office of Naval Research (ONR).
- 2010 Dimension reduction for hyperspectral data, supported by the National Geospatial-Intelligence Agency (NGA) NURI.

## Talks

- Oct. 2017 *A denoising formulation of full-waveform inversion*, SEG 2017
- Mar. 2017 *Frequency extrapolation for seismic traces*, University of San Francisco.
- Jan. 2017 *Two frequency extrapolation methods in seismic data analysis*, Michigan State University
- Oct. 2016 *Frequency down-extrapolation with TV norm minimization*, SEG 2016
- Oct. 2016 *Two methods for frequency down-extrapolation*, SINBAD Fall Consortium Talks, 2016
- Dec. 2016 *Data processing method for seismic application*, Weishi Forum, Beijing University of Aeronautics and Astronautics, 2016
- Dec. 2015 *Efficient quantization for signals with sparse structures*, University of Minnesota
- Oct. 2015 *Resolving scaling ambiguities with the  $\ell_1/\ell_2$  norm in a blind deconvolution problem with feedback*, SINBAD Fall Consortium Talks
- Oct. 2015 *Improving Full-Waveform Inversion with spectral extrapolation*, SINBAD Fall Consortium Talks
- June 2015 *Wavefield-denoising and source encoding*, SIAM Conference on Mathematical and Computational Issues in the Geosciences.
- April 2015 *Exponential rate distortion for Sigma Delta quantization with compressed sensing*, Data Compression Conference.
- Dec. 2014 *Sigma-Delta quantization with frames and compressed sensing*. Foundation of Computational Mathematics
- Dec. 2014 *Denoising the wavefield inversion problem through source encoding*. SINBAD Fall consortium

- Oct. 2014 *Sigma-Delta quantization in compressed sensing with sub-Gaussian measurements.* Fall Eastern Sectional Meeting of AMS.
- May 2014 *A one stage reconstruction method for Sigma-Delta quantization in compressed sensing,* 5th International Conference on Computational Harmonic Analysis.
- Dec. 2013 *Noise reduction by using interferometric measurements.* SINBAD Fall Consortium Talks. 2013
- Feb 2013 Poster presentation, *Conditioning of random subdictionaries, incoherence and sparse recovery,* February Fourier Talks, University of Maryland.

#### **ACADEMIC SERVICE**

- Organizer of CMSE Brownbag, Michigan State University (2017-2018).
- Organizer of applied math seminar, Michigan State University (2017-2018).
- Organizer of Dnoise seminar, the University of British Columbia (2015-2016).
- Co-organizer of harmonic analysis seminar, University of Maryland ( 2011-2012).

#### **COMPUTER SKILLS**

- Matlab
- C
- Latex
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