SIWEI YU

Harbin Institute of Technology, Harbin, Heilongjiang Province, China, 150001

+86-15045650982 ⋄ siweiyu@hit.edu.cn

EDUCATION

Tsinghua University, China *Sep,2006–July,2010*
B.S. in Aerospace Engineering

Tsinghua University, China *Sep,2010–July,2013*
M.S. in Aerospace Engineering
Supervisor: Prof. Huizhu Yang

Harbin Institute of Technology, China *March,2014–May,2017*
Ph.D. in Mathematics
Supervisor: Prof. Jianwei Ma

University of California, Los Angeles, USA *Oct,2014–Sep,2016*
Visiting student in Mathematics Department
Supervisor: Prof. Stanley Osher

RESEARCH INTERESTS

· **Compressive sensing, Optimization algorithm**
· **Dictionary learning, Deep learning**
· **Signal processing, Seismic data processing**

PUBLICATIONS

· **Yu, S.**, Ma, J., Wang, W. Deep learning for denoising. 2017, in preparation.

· **Yu, S.**, Ma, J., Osher, S. Geometry mode decomposition. **Inverse problem and imaging**, 2017, in revision.

· **Yu, S.**, Ma, J., Osher, S. Variational mode decomposition of seismic data. **IEEE Transactions on Geoscience and Remote Sensing**, 2017, accepted.

· **Yu, S.**, Osher S., Ma, J., Shi, Z. Noise attenuation in a low dimensional manifold, **Geophysics**, 2017, 82(5), 321-V334.

· **Yu, S.**, Ma, J., Osher, S. Monte Carlo data-driven tight frame for seismic data recovery. **Geophysics**, 2016, 81(4): V327-V340.

· **Yu, S.**, Ma, J., Zhang, X., Sacchi, M. D. . Interpolation and denoising of high-dimensional seismic data by learning a tight frame. **Geophysics**, 2015, 80(5): V119-V132.

· **Yu, S.**, Khwaja, A. S., Ma, J. Compressed sensing of complex-valued data. **Signal Processing**, 2012, 92(2), 357-362.

· Ma, J., **Yu, S.**, Sparsity in compressive sensing, **The Leading Edge**, 2017, 36(8): 308-314.

· Jia, Y., **Yu, S.**, Ma, J., Intelligent interpolation by Monte Carlo machine learning, **Geophysics**, 2017, in revision.

· Jia, Y., **Yu, S.**, Liu, L., Ma, J. A fast rank-reduction algorithm for three-dimensional seismic data interpolation. **Journal of Applied Geophysics**, 2016, 132: 137-145.

· Kong, L., **Yu, S.**, Cheng, L., Yang, H. Application of compressive sensing to seismic data reconstruction. **Acta Seismologica Sinica**, 2012, 34(5): 659-666. (In Chinese)

· Ma, J., Xue, J., Bao Y., **Yu, S.**. Compressive Sensing and its Application: from Sparse to Low-rank Regularized Optimization. **Signal Processing**, 2012, 28(5), 609-623. (In Chinese)

CONFERENCE AND REPORTS

·**Yu, S.** and Ma, J., Geometry mode decomposition of seismic data, 7th International Conference on Environmental and Engineering Geophysics (ICEEG), 2016, Beijing
·**Yu, S.**, Ma, J., Osher, S. Geometry mode decomposition, June 2016, UCLA
·**Yu, S.**, Ma, J., Osher, S. Geometry mode decomposition, July 2016, UCSC
·**Yu, S.** and Ma, J., Random seismic noise attenuation with variational mode decomposition, SEG Geophysical Compressed Sensing Workshop, Dec 2015, Beijing
·**Yu, S.** and Ma, J., Recovery of seismic data with Monte Carlo data driven tight frame, SEG Geophysical Compressed Sensing Workshop, Dec 2015, Beijing
·**Yu, S.**, Ma, J., Osher, S. Monte Carlo data driven tight Frame for seismic data recovery, Aug 2015, UCLA
·**Yu, S.** and Ma, J., Interpolation and Denoising of High-Dimensional Seismic Data by Learning a Tight Frame, Int. Conf. Signal Processing, Optimization and Compressed Sensing (SPOC), Dec 2013, Harbin

RESEARCH EXPERIENCE

Low-rank matrix completion and seismic applications   NFSC, *Jan, 2014–Dec, 2016*

· Missing traces increase the rank of Hankel matrix generated from the spectrum of seismic data. A low-rank constraint is applied on the Hankel matrix for reconstruction of the missing traces.

3D data-driven tight frame for seismic data reconstruction   NFSC, *Jan, 2014–Dec, 2017*

· Data driven tight frame adaptively trains an optimized sparse transform from the data itself, which is used for better reconstruction of seismic data. Monte Carlo method is introduced for improving the efficiency.

High performance computing on energy exploration   National Key R&D Program of China, *July, 2017–June, 2021*

· Three dimensional seismic exploration produces huge amount data which requires massive computional resources and human labor. High performance computing algorithms are required to be distributed on super computers. Machine learning is used for reducing human labor.

DOCTORIAL DISSERTATION

Seismic data reconstruction based on adaptive sparse inversion

· **Data driven tight frame, DDTF**
I extended data driven tight frame to three and five dimension and applied it on seismic interpolation. Then I proposed using the idea of Monte Carlo in DDTF which improved the efficiency more than ten times.

· **Varitional mode decomposition, VMD**
I extended VMD to complex-valued situation and applied on the spectrum of seismic data for denoising. Then I proposed Geometry mode decomposition by taking into account the linear assumption of seismic data.

TECHNICAL STRENGTHS

Computer Languages	Matlab, C, Fortran, Python
Programming Skills	Linux programming, GPU programming, MPI Parallel computing

AWARDS

· **Friend of Tsinghua, Guanghua first class scholarship**	*2011*
· **China Scholarship Council funded visiting project**	*Oct, 2014–Sep, 2016*
· **National scholarship for doctoral students**	*Nov, 2016*