Zhaolun Liu

Personal Data

Address:	King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, Mail Box. 2963, P.O.Box. 4700, Postal Code 23955-6900
Phone:	+966 (0)570 89 0686
email & website:	zhaolun.liu@kaust.edu.sa; www.liuzhaolun.com

Research Area

Machine learning:	Neural network least squares reverse time migration; convolutional sparse coding for noise attenuation of seismic data
Seismic inversion:	3D wave-equation dispersion inversion (WD) of surface waves & full waveform inversion with finite difference method or spectral element method
Seismic imaging:	Natural migration & reverse time migration
Seismic modeling:	Acoustic/elastic simulation in the frequency domain by the implicit finite-difference scheme

Education

expected Dec 2018 **King Abdullah University of Science and Technology**
Ph.D., Geophysics, Gpa: 3.79/4, Supervisor: Professor Gerard T. Schuster

July 2015 **Ocean University of China**
MSc, Applied Geophysics, Gpa: 94.1/100

July 2012 **Ocean University of China**
B.Eng., Applied Geophysics, Gpa: 88.5/100

Research Experience

2015 - Current **King Abdullah University of Science and Technology, Saudi Arabia**
Ph.D. Researcher
- Developed an advanced 3D surface-wave inversion and migration algorithm
- Successfully apply the machine learning method to seismic denoising and migration
- Presented work at local and international scientific meetings

Feb - Mar 2018 **TOTAL, E&P Research and Technology, Houston, USA**
Intern
One of the seven "Supermajor" oil companies in the world
- Worked on the wave-equation dispersion inversion algorithm
- Tested the algorithm on both the synthetic and field data set successfully

Jun - Nov 2017 **Los Alamos National Laboratory, NM, USA**
Intern
United States Department of Energy national laboratory
- Developed a multiscale and layer-stripping method to alleviate the local minimum problem of wave-equation dispersion inversion of Rayleigh waves
- Applied it to the field data from a geothermal field successfully

2012 - 2015 **Ocean University of China, China**
Master's Researcher
- Developed an implicit difference scheme for frequency-domain forward modeling
- Developed codes of reverse time migration with an acceleration of GPU
- Processed seismic data using Promax and lab-own software, MBP

Apr 2012-Jun 2012 **Ocean University of China, China**
Summer Undergraduate Researcher
- Implemented the reverse time migration(RTM) of the acoustic equation
- My thesis won Best Graduation Thesis of OUC (top 1/60 in the department)

2010- 2011 **Student Research Development Program, Ocean University of China**
Team Leader
- Predicted coal and gas outburst based on the theory of porous dissipative media
- Developed programs to extract seismic attributes by wavelet transform of seismic data
- Completed a research paper, and won Outstanding Program of OUC

Skills

Programming	C/C++, Fortran, Matlab, Python, MPI, CUDA
Seismic software	Seismic Unix, Madagascar, Promax, SPECFEM2D/3D
Research Tools	LaTeX, Vim, Makefile, MS office, PS

Awards and Honors

Nov 2017	Best Student Presentation at the 2017 SEG Beijing FWI workshop
2013 - 2014	First Class Scholarship(top 1/40, twice) Outstanding Graduate Student(top 1/40, twice)
Oct 2013	The National Scholarship (for academic achievements, top 2.5%)
Oct 2013	First Prize in Mathematical Contest in Modeling of OUC (top 1/30)
Jun 2012	Outstanding Graduate (province level, for best student thesis)
2009-2011	Second Class Scholarship(top 2/35, three times) Outstanding Student(top 2/35, three times)
Oct 2010	Tian-Tai Scholarship
Oct 2009	China National Petroleum Corporation Scholarship

Peer Reviewer for Journals

Geophysics, Geophys. J. Int., Interpretation, Journal of Ocean University of China, SEG Technical Program Expanded Abstracts

Publications

- Liu, Z., Hanafy, S., Li, J., and Schuster, G., 3D wave-equation dispersion inversion of Rayleigh waves, **submit for publication**, 2018
- Liu, Z., and Huang, L., Multiscale and layer-stripping wave-equation dispersion inversion of Rayleigh waves, **submit for publication**, 2018.
- Fu, L., Liu, Z., and Schuster, G., 2017, Superresolution near-field imaging with surface waves[J]. **Geophys. J. Int.**, 212(2), 1111-1122
- Liu, Z., Altheyab, A., Hanafy, S., and Schuster, G., 2017, Imaging near-surface heterogeneities by natural migration of surface waves: field data test[J]. **Geophysics**, 82(3), S197-S205
- Liu, Z., Song, P., Li, J., et al, 2015, An optimized implicit finite-difference scheme for the two-dimensional Helmholtz equation[J]. **Geophys. J. Int.**, 202(3): 1805-1826.
- Song, P., Liu, Z., Tan, J., et al, 2015, The fourth-order absorbing boundary condition with optimized coefficients for simulation of acoustic equation[J]. **J. Geophys. Eng.**, 12(6): 996-1007.

Abstracts/Presentations

- Liu, Z., and Schuster, G., Neural network least squares migration, **EAGE/SBGF Workshop on Least-Squares Migration**, Rio de Janeiro, 2018
- Liu, Z., Lu, K., and Ge, X., Convolutional sparse coding for noise attenuation of seismic data, **SEG Maximizing Asset Value through Artificial Intelligence and Machine Learning Workshop**, Beijing, 2018
- Liu, Z., and Huang, L., Multiscale and layer-stripping wave-equation dispersion inversion of Rayleigh waves, **SEG Expanded Abstracts**, 2018.
- Liu, Z., Hanafy, S., Li, J., and Schuster, G., 3D Wave-equation dispersion inversion of Rayleigh waves, **SEG Expanded Abstracts**, 2018.
- Lu, K., Liu, Z., and Ge, X., Semi-stationary supervirtual interferometry of reflections and diving waves, **CSIM 2017 Annual Report**.
- Liu, Z., Li, J., and Schuster, G., 3D wave-equation dispersion inversion of surface waves, **SEG 2017 Workshop**: Full-waveform Inversion and Beyond, Beijing, China, 2017.
- Liu, Z., Altheyab, A., Hanafy, S., and Schuster, G., Imaging near-surface heterogeneities by natural migration of surface waves, 86th Annual International Meeting, **SEG Expanded Abstracts**, 2016.

Theses

- Z. Liu, 2015, Seismic forward modeling in the frequency-space domain based on the implicit finite-difference scheme (abstract in English), MSc Thesis, Ocean University of China, Qingdao, China.
- Z. Liu, 2012, The reverse time migration based on the acoustic wave equation (abstract in English), BSc Thesis, Ocean University of China, Qingdao, China.