Yunsong Huang

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Education

PhD in Geophysics GPA 3.93/4.0 Dec. 2013
King Abdullah University of Science and Technology Thuwal, Saudi Arabia
Dissertation: "Least-squares Migration and Full Waveform Inversion with Multisource Frequency Selection" under Prof. Gerard T. Schuster

MS in Electrical Engineering GPA 3.97/4.0 Dec. 1998
University of Southern California (USC) Los Angeles, CA

BS in Physics GPA 3.86/4.0 Jul. 1994
University of Science and Technology of China Hefei, China
Thesis: "Study on the Microstructure of Solid C_{60}"

Selected Coursework

- Machine Learning — Stanford, 2016
- Advanced Topics in Neural Network and Statistical Learning — USC, 2000
- Brain Theory and Artificial Intellligence — USC, 1995
- Mathematical Pattern Recognition — USC, 1994

Media Recognition

Issuu Kaustbeacon: Seismic echo turns into super-resolution images — Feb. 2017
Nature Asia: The finest features — May 2016
Issuu Kaustbeacon: Seismology — Jan. 2011

Teaching Experience

Teaching Assistant King Abdullah University of Science and Technology 2011–2012

- Courses: Basic Seismology; Seismic Interferometry
- Designed computational labs, by developing computer code, writing up instructions in HTML, and giving lectures on the labs
- Composed homework solutions
- Held regular office hours to aid students in doing homework and labs
- Graded the homework, labs, and exams

Teaching Assistant USC 1997–2007

- Courses: Mathematical Pattern Recognition; Optical Information Processing; VLSI System Design; Probability Theory for Engineers; Transform Theory for Engineers; Introduction to Digital Logic
- Led discussion sections
- Composed homework solutions
- Designed portions of exams
- Held regular office hours to aid students in doing homework and projects
- Promoted student success by making myself available to students through emails and special appointments outside of classrooms and office hours

Academic Services

Associate editor and **organizing assistant editor** of
Interpretation 2016–present

Associate editor of
Current Research in Geoscience 2017–present

Session chair of "Emerging technology" at
Stanford Workshop on Geothermal Reservoir Engineering Feb. 2017

Reviewer for about 100 manuscripts in 14 journals and a series of conferences: 2011–present

Commun in Comput Physics	*Geophys Prospecting*	*Comput Geosci*
Frontiers of Info Tech & Electr Engr	*Int J of Physical Sci*	*Exploration Geophys*
IEEE Trans on Geosci and Remote Sensing	*J of Appl Geophys*	*Geophys J Int*
J of Real-Time Image Processing	*Pure and Appl Geophys*	*Geophysics*
Palaeogeogr, Palaeoclimatol, Palaeoecol	*SEG Annual Meetings*	*Interpretation*

Awards and Honors

The Top 25 Most Downloaded/Read Paper of *J of Appl Geophys* Oct. 2014
Academic Excellence Award, KAUST 2012
King Abdullah University of Science and Technology (KAUST) Fellowship 2009–2010
All-University Pre-doctoral Merit Fellowship, USC 1994–1997

Patent (pending) Huang, L., K. Gao, and **Y. Huang**, Systems and methods for plane-wave ultrasound-waveform tomography. Application No. 62/693,344 Jul. 2018

Skills

Programming: C/C++, Fortran, Matlab, Python, MPI and OpenMP
Languages: English (fluent), Chinese (native speaker), German (basic)

Research Experience

Postdoctoral Research Associate Los Alamos National Laboratory 2016–present
- Improved images of geothermal exploration fields using anisotropic imaging methods
- Attenuated ground-roll noise in surface seismic data with an adaptive filter

Research Geophysicist CGG 2015–2016
- Improved Surface Related Multiple Elimination at far offsets by Radon-guidance
- Innovated and implemented improved dip gathers at high dips
- Conducted data preprocessing and then anisotropic waveform inversion on an offshore project

Geophysics Intern TOTAL E&P Summer 2012
- Optimized finite-difference for seismic wave extrapolation

Research Assistant/Scientist KAUST 2010–2015
- Sped up seismic imaging by proposing and implementing a frequency division scheme
- More than doubled the image resolution of reflectors, by capitalizing on resonant echoes
- Enhanced image resolution by spatially adaptive alignments across prestack image gathers

Research Assistant USC 1997–2008
- Developed a biologically plausible statistical vision model that can compute efficiently on a photonic multichip module structure
- Mapped biological vision algorithms onto electro-photonic substrate with temporal multiplexing
- Segmented texture images with proposed hierarchical mixture model of perturbed Gaussian processes

Publications

□ As per Google Scholar: Citations: 310, h-index: 8 Oct. 2018

□ Monograph

***Huang, Y.**, 2017, *Full waveform inversion with multisource frequency selection: for marine-streamer or land-streamer data* , LAP Lambert Academic Publishing, Saarbrücken, ISBN: 978-3-330-07309-8.

□ Journal articles

25. ***Huang, Y.**, A. Abubakar, D. Colombo, K. Gao, J. Kim, M. Mantovani, M. Meju, C. Shin, A. Vesnaver, R. Yan, P. Yu, and L. Zhang, Introduction to special section: Multiphysics imaging for exploration and reservoir monitoring, *Interpretation* 6(3), 1–2. doi: 10.1190/int-2018-0713-spseintro.1

24. ***Huang, Y.** and G.T. Schuster, 2018, Full waveform inversion with multisource frequency selection of marine streamer data, *Geophysical Prospecting* 66, 1243-1257. doi: 10.1111/1365-2478.12588

23. Dutta, G., T. van Leeuwen, A. Ibrahim, A. Klokov, and **Y. Huang**, 2017, Introduction to special section: Skeletonized/sparse/multiscale geophysical inversion for the interpreter, *Interpretation* 5(3), 1–1. doi: 10.1190/int-2017-0626-spseintro.1

22. Yu, H., D. Zhang, and **Y. Huang**, 2017, Application of early arrival waveform inversion with pseudo-deconvolution misfit function by source convolution, *Inverse Problems in Science and Engineering*, 25(1), 57–72. doi:10.1080/17415977.2016.1138945

21. Guo, B., **Y. Huang**, A. Røstad, and G.T. Schuster, 2016, Far-field super-resolution imaging of resonant multiples, *Science Advances* 2(5), e1501439, doi:10.1126/sciadv.1501439
    Reported by both *Nature Asia*: Research Highlights: The finest features
    and *Issuu Kaustbeacon*: Seismic echo turns into super-resolution images

20. Yu, H., **Y. Huang**, and B. Guo, 2016, Near-surface fault detection by migrating back-scattered surface waves with and without velocity profiles, *Journal of Applied Geophysics*, 130, 81–90. doi:10.1016/j.jappgeo.2016.04.013

19. ***Huang, Y.**, R. He, C. Boonyasiriwat, Y. Luo, and G.T. Schuster, 2015, Specular interferometric imaging of VSP data, *Interpretation* 3(3), SW57–SW62. doi: 10.1190/INT-2014-0251.1

18. ***Huang, Y.**, D. Zhang, and G.T. Schuster, 2015, Tomographic resolution limits for diffraction imaging, *Interpretation* 3(1), SF15-SF20. doi: 10.1190/INT-2014-0079.1

17. ***Huang, Y.** and G.T. Schuster, 2015, The traveltime holographic principle, *Geophysical Journal International* 200, 106–110. doi: 10.1093/gji/ggu382

16. Hanafy, S.M., **Y. Huang**, and G.T. Schuster, 2015, Benefits and limitations of imaging multiples: Mirror migration, *The Leading Edge* 34(7), 796–800. doi: 10.1190/tle34070796.1

15. Guo, B., J. Yu, **Y. Huang**, S.M. Hanafy, and G.T. Schuster, 2015, Benefits and limitations of imaging multiples: Interferometric and resonant migration, *The Leading Edge* 34(7), 802–805. doi: 10.1190/tle34070802.1

14. Schuster, G.T. and **Y. Huang**, 2014, Far-field superresolution by imaging of resonant multiples, *Geophysical Journal International* 199, 1943–1949. doi: 10.1093/gji/ggu350

13. Yu, H. and **Y. Huang**, 2014, Frequency-wavenumber domain phase inversion along reflection wavepaths, *Journal of Applied Geophysics* 111, 14–20. doi: 10.1016/j.jappgeo.2014.09.012

12. ***Huang, Y.**, G. Dutta, W. Dai, X. Wang, J. Yu, and G.T. Schuster, 2014, Making the most out of least-squares migration, *The Leading Edge* 33(9), 954–960. doi: 10.1190/tle33090954.1

11. ***Huang, Y.** and G.T. Schuster, 2014, Resolution limits for wave equation imaging, *Journal of Applied Geophysics* 107, 137–148. doi: 10.1016/j.jappgeo.2014.05.018

10. Schuster, G.T., **Y. Huang**, S.M. Hanafy, M. Zhou, J. Yu, O. Alhagan, and W. Dai, 2014, Review on improved seismic imaging with closure phase, *Geophysics*, 79(5), W11–W25. doi: 10.1190/geo2013-0317.1

9. Dai, W., **Y. Huang**, and G.T. Schuster, 2013, Least-squares reverse time migration of marine data with frequency-selection encoding, *Geophysics* 78(4), S233–S242. doi: 10.1190/geo2013-0003.1

8. ***Huang, Y.** and G.T. Schuster, 2012, Multisource least-squares migration of marine streamer and land data with frequency-division encoding, *Geophysical Prospecting* 60, 663–680. doi: 10.1111/j.1365-2478.2012.01086.x

7. Schuster, G.T., S. Hanafy, and **Y. Huang**, 2012, Theory and feasibility tests for a seismic scanning tunneling macroscope, *Geophysical Journal International* 190, 1593–1606. doi: 10.1111/j.1365-246X.2012.05564.x

6. Schuster, G.T., X. Wang, **Y. Huang**, W. Dai, and C. Boonyasiriwat, 2011, Theory of multisource crosstalk reduction by phase-encoded statics, *Geophysical Journal International* 184, 1289–1303. doi: 10.1111/j.1365-246X.2010.04906.x

5. Shi, L., **Y. Huang**, Y. Jia, X. Liu, G. Zhou, and Y. Zhang, 1998, Study on the crystal and electronic structure of $Y_{1-x}Pr_xBa_2Cu_3O_{7-y}$ ceramics, *Journal of Physics: Condensed Matter* 10, 7015–7024. doi: 10.1088/0953-8984/10/31/017

4. Shi, L., **Y. Huang**, W. Pang, X. Liu, L. Wang, X. Li, G. Zhou, and Y. Zhang, 1997, Study on the Pr-doped and Ce-doped $YBa_2Cu_3O_y$ system by XPS and Raman Spectrum, *Physica C: Superconductivity* 282-287, 1021–1022. doi: 10.1016/S0921-4534(97)00591-1

3. Shi, L., **Y. Huang**, Y. Feng, G. Zhou, and Y. Zhang, 1997, Scattering Factor of C_{60} Molecule, *Chinese Journal of Structunal Chemistry*, 16(5), 342–344. doi: 10.14102/j.cnki.0254-5861.1997.05.003

2. Shi, L., G. Zhou, Y. Feng, **Y. Huang**, Y. Fang, M. Xu and Y. Zhang, 1997, Temperature dependent structural change of $YBa_2Cu_3O_{7-y}$ single crystals studied by X-ray diffraction, *Physica Status Solidi (b)*, 203(2), 305–311.

1. Shi, L., **Y. Huang**, G. Zhou, and Y. Zhang, 1996, A preliminary study on the amorphous scattering of clusters in C_{60} crystals, *Acta Physica Sinica* 45(12), 48–53.

□ Conference Presentations and Proceedings

23. ***Huang, Y.**, K. Gao, M. Zhang, A. Sabin, and L. Huang, 2018, Imaging fracture zones at Eleven-Mile Canyon using anisotropic least-squares reverse-time migration, *Geothermal Resources Council Transactions* 42, 1402–1413.

22. Huang, L., K. Gao, and **Y. Huang**, 2018, Transrectal ultrasound-waveform tomography using plane-wave ultrasound reflection data for prostate cancer imaging, *Proceedings of SPIE, Medical Imaging* 10573 (9 March 2018), Houston, Texas. doi: 10.1117/12.2293956

21. Huang, L., K. Gao, **Y. Huang**, and T. Cladouhos, 2018, Anisotropic seismic imaging and inversion for subsurface characterization at the Blue Mountain geothermal field in Nevada, *Proceedings, 43rd Workshop on Geothermal Reservoir Engineering*, Stanford University, California.

20. Zhang, M., L. Huang, K. Gao, **Y. Huang**, and A. Sabin, 2018, High-resolution seismic imaging for geothermal exploration at Eleven-Mile Canyon in Nevada, *Proceedings, 43rd Workshop on Geothermal Reservoir Engineering*, Stanford University, California.

19. ***Huang, Y.**, M. Zhang, and L. Huang, 2017, Ground-roll noise suppression in land surface seismic data using a wavenumber-adaptive bandpass filter, *Geothermal Resources Council Transactions* 41, 1659–1668.

18. Li, D., K. Gao, **Y. Huang**, M. Zhang, B. Chi, J. Moore, and L. Huang, 2017, Subsurface imaging of Raft River geothermal field using 2010 walkaway VSP data, *Proceedings, 42nd Workshop on Geothermal Reservoir Engineering*, Stanford University, California.

17. Guo, B., G.T. Schuster, and **Y. Huang**, 2015, Prediction and migration of surface-related resonant multiples, SEG Annual meeting, New Orleans. doi: 10.1190/segam2015-5859900.1

16. Guo, B., **Y. Huang**, and G.T. Schuster, 2015, Super-resolution by moveout correction and migration of surface-related resonant multiples, EAGE Conference and Exhibition–Workshops, Madrid, Spain. doi: 10.3997/2214-4609.201413505

15. Dutta, G., **Y. Huang**, W. Dai, X. Wang, and G.T. Schuster, 2014, Making the most out of the least (squares migration), SEG Annual meeting, Denver. doi: 10.1190/segam2014-1242.1

14. ***Huang, Y.**, 2014, A misfit function tolerating inconsistent data, SEG Annual meeting, Denver, USA. doi: 10.1190/segam2014-1470.1

13. ***Huang, Y.**, G.T. Schuster, and X. Wang, 2014, Non-local means filter for trim statics, SEG Annual meeting, Denver, USA. doi: 10.1190/segam2014-0352.1

12. Wang, X., **Y. Huang**, W. Dai, and G.T. Schuster, 2014, 3D plane-wave least-squares Kirchhoff migration, SEG Annual meeting, Denver, USA. doi: 10.1190/segam2014-1362.1

11. Schuster, G.T., and **Y. Huang**, 2014, Far-field superresolution by resonance-scattering imaging, SEG Annual meeting, Denver, USA. doi: 10.1190/segam2014-0344.1

10. Zhang, D., X. Wang, **Y. Huang**, and G.T. Schuster, 2014, Warping for trim statics, SEG Annual meeting, Denver, USA. doi: 10.1190/segam2014-0281.1

9. Dai, W., **Y. Huang**, and G.T. Schuster, 2013, Least-squares reverse time migration of marine data with frequency-selection encoding, SEG Annual meeting, Houston, Texas. doi: 10.1190/segam2013-0412.1

8. ***Huang, Y.** and G.T. Schuster, 2013, Multisource full waveform inversion of marine streamer data with frequency selection, EAGE Annual meeting, London, United Kingdom. doi: 10.3997/2214-4609.20130833

7. Schuster, G.T., S. Hanafy, and **Y. Huang**, 2012, Seismic scanning tunneling macroscope: Theory, SEG Annual meeting, Las Vegas, Nevada. doi: 10.1190/segam2012-0434.1

6. ***Huang, Y.** and G.T. Schuster, 2012, Multisource least-squares migration of marine streamer data with frequency-division encoding, EAGE Annual meetingProceedings, Copenhagen, Denmark.

5. ***Huang, Y.** and B.K. Jenkins, 2005, Non-iterative estimation with perturbed Gaussian Markov processes, *Neural Information Processing Systems (NIPS)*, December 5–8, Vancouver, British Columbia, Canada. In: Y. Weiss, B. Schölkolpf, and J.C. Platt (Eds.), *Advances in Neural Information Processing Systems 18*, pp. 531–538, MIT Press.

4. ***Huang, Y.** and B.K. Jenkins, 2004, Fast and biologically plausible computation with perturbed Gaussian Markov processes, *11th Joint Symposium on Neural Computation*, University of Southern California, California.

3. ***Huang, Y.** and B.K. Jenkins, 2002, Hierarchical mixture model of perturbed Gaussian processes and its application in texture segmentation, *6th International Conference on Cognitive and Neural Systems*, Boston University, Massachusetts.

2. Tanguay, A.R., B.K. Jenkins, C. von der Malsburg, B. Mel, G. Holt, J. O'Brien, I. Biederman, A. Madhukar, P. Nasiatka, and **Y. Huang**, 2000, Vertically integrated photonic multichip module architecture for vision applications, *Optics in Computing 2000*, June 18-23, Quebec City, Canada. In: R. A. Lessard and T. Galstian (Eds.), SPIE Vol. 4089, pp. 584-600. doi: 10.1117/12.386880

1. ***Huang, Y.** and B.K. Jenkins, 2001, Hierarchical Bayesian model for image segmentation, Annual Meeting of the Optical Society of America, Long Beach, California.