CURRICULUM VITAE OF ZUOWEI SHEN

Personal

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Education

University of Alberta (Canada)	(Ph.D. 1991)	1987-1991
University of Alberta (Canada)	(M.Sc. 1987)	1985–1987
Hehai University (China)	(B.Sc. 1982)	1978–1982

Professional Experience

Distinguished Professor — 2009–present
National University of Singapore

Professor — 2002–present
Department of Mathematics, National University of Singapore

Associate Professor–Senior Lecturer–Lecturer — 2002–1998–1997–1993
Department of Mathematics, National University of Singapore

Research Associate
Center for the Mathematical Sciences — 1991–1993
University of Wisconsin-Madison

Research Interests

Approximation and Wavelet Theory, Time-Frequency Analysis, Imaging Sciences

Awards and Honors

Wavelet Pioneer Award: Society of Photographic Instrumentation Engineers (SPIE), USA, 2012.
Fellow: Singapore National Academy of Science, 2011.
Invited Speaker: International Congress of Mathematicians, Hyderabad, 2010.
Distinguished Professor: National University of Singapore, 2009–present.
Outstanding University Researcher Award: the National University of Singapore, 2008, 1997.
Outstanding Scientist Award: Faculty of Science, National University of Singapore, 2007.

National Science Award of Singapore: Singapore, 1998 (joint).
Andrew Stewart Graduate Prize for Doctoral Research: the University of Alberta, 1990.

Member of Editorial Board

1. SIAM Journal on Mathematical Analysis, 2010–present
2. Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal, 2009–present
3. Mathematics of Computation, 2011–present
4. Journal of Approximation Theory, 2001–present
5. Applied and Computational Harmonic Analysis, 2007–present
6. Journal of Fourier Analysis and Applications, 2007–present
7. The Springer-Birkhauser Applied and Numerical Harmonic Analysis (ANHA) Book Series, 2010–present
8. Inverse Problems and Imaging, 2009–present
9. Sampling Theory in Signal and Image Processing, 2005–present
10. Journal of Computational Mathematics, 2007–present
11. International Journal of Numerical Analysis and Modeling, 2005–present
12. East Asia Journal on Applied Mathematics
13. International J. of Wavelet, Multiresoultion and Information Processing, 2004–present
14. Journal of Wavelet Theory and Applications 2007–present
15. International Journal of Tomography and Statistics, 2005–present

Grants

• Principal investigator a MOE grant MOE2011-T2-1-116 (Singapore), 2012-2014.
• Principal investigator of an ARF grant R-146-000-113-112 (Singapore), 2008-2012.
• Co-principal investigator of a grant from Defense Science and Technology Agency (DSTA), Singapore, (R-394-000-013-422), 2001-2006-2010.
• Principal investigator of an ARF grant R-146-000-060-112 (Singapore), 2004-2008.
• Co-principal investigator of an ARF Grant RP3981647 (Singapore), 1998-2002.
• Co-principal investigator of Hong Kong Research Grant Council Grant CUHK400503, 2003-2005.
• Collaborator of Hong Kong Research Grant Council Grant CUHK4243/01P, 2001-2004.
• A key member of a joint research grant with the wavelet group at the National University of Singapore co-funded by the Ministry of Education, Singapore and the National University of Singapore, 3602035, 1996-2001.
• Participant in NATO Collaborative Research Grant CRG 901018, 1991-1992.

Conferences and Workshops

Series of Talks/Mini-Course

• "MRA Based Wavelet Frames and Applications" Summer school July, 2011, University of Alberta, Canada.

• "MRA Based Wavelet Frames and Applications" Summer school on medical images, July 2011, Shanghai Jiaotong University, China.

• "MRA Based wavelet Frames and Applications" Summer school on Data Sciences, July 2011, Fudan University, China.

• "Framelet and Image Restorations", The Mathematics of Image Processing, June-July 2010, IAS/Park City Mathematics Program, USA.

• "Wavelets and Frames" (mini course), SFMA Symposium on Wavelet Methods in Mathematical Analysis and Engineering, August 2007, Zhuhai campus, Sun Yat-sen (Zhongshan) University, China.

• "Wavelets and Applications" (Mini-course), May 2006, Fudan University, China.

• "Framelets and Applications" (Mini-course), The Tenth Mathematical Graduate Summer School of China, July-August, 2005, Guangzhou, China.

• "Wavelet Frames and Image Processing"; "Wavelet Frames: Theory and Application", The Second International Conference on Abstract and Applied Analysis" and the International Summer School on Harmonic, Wavelet and p-adic Analysis; June, 2005, Vietnam.

• 'Dual Gramian Analysis"; " Wavelet Frame: Theory and Application"; and "Unitary Extension Principle and Applications", February, 2005, Korea Advanced Institute of Science and Technology, Korea.

• "Wavelet in Image Processing"; "Dual Gramian Analysis"; and " Wavelet Frame: Theory and Application", International Workshop on Wavelet Theory and Applications, April-May, 2004, Charlottetown, Canada.

•"Cardinal Interpolation and Biorthogonal Wavelets" and "Affine Frames in $L_2(R^d)$", Wavelet and Integral Equation Program, June, 2000, Beijing, China.

• "Construction of wavelets " and " Frames and Stable Bases for Shift Invariant Subspaces of $L_2(\mathbf{R}^d)$", International Conference on Harmonic Analysis and Wavelet Analysis, June, 1996, Beijing, China.

Plenary and Invited Talks

• Plenary: Asian Mathematical Conference, June, 2013, Busan, South Korean.

• Invited: Adaptive Data Analysis and Sparsity, January, 2013, IPAM, UCLA, USA.

• Plenary: The Forum: Math-for-Industry, October, 2012, Fukuoka, Japan.

• Invited: Applied Harmonic Analysis and Sparse Approximation, June, 2012, Oberwolfach, Germany.

• Plenary: The Second Regional Conference on Applied and Engineering Mathematics, May 2012, Penang, Malaysia.

• Invited: SPIE Defense, Security, and Sensing; Baltimore, Maryland, USA.

• Plenary: International Conference in Applied Mathematics, April, 2012, Shanghai, China.

• Invited: Advances in Scientific Computing, Imaging Science and Optimization: Stan Osher's 70th Birthday Conference, April, 2012, IPAM, UCLA, USA.

• Invited: International Conference on Scientific Computing 2012, in honor of Prof. Tony Chan at his 60th birthday, January, 2012, Hong Kong, China.

• Invited: The Second Tsinghua -Sanya International Mathematics Forum at Sanya, December, 2011, Sanya, China.

• Plenary: The International Conference on Frontiers of Computational and Applied Mathematics, Oct. 2011, Peking University, Beijing, China.

• Plenary: International Conference on Applied Harmonic Analysis and Multiscale Computing, July, 2011, Edmonton, Canada.

• Invited: From Abstract to Computational Harmonic Analysis, June 2011, Vienna, Austria.

• Plenary: The 9th International Conference on Sampling Theory and Applications, May, 2011, Singapore.

• Invited: International Congress of Mathematicians August, 2010 (Section: Numerical Analysis and Scientific Computing), Hyderabad, India.

• Plenary: The 11th Biannual Conference of the Chinese Society of Industrial and Applied Mathematics (CSIAM), July, 2010, Chongqing, China.

• Invited: The Fifth Pacific Rim Conference of Mathematics, July 2010, Stanford University, USA.

• Invited: International Workshop on Scientific Computing and Nonlinear Partial Differential Equations, June, 2010, JiuZhaiGou National Park, China.

• Invited: the First Workshop on Interdisciplinary Applied and Computational Mathematics, June, 2010, Zhejiang University, China.

• Invited: Workshop on Mathematical Aspect of Data Science, May, 2010, Shanghai, China.

• Invited: Workshop on Mathematical Problems, Models and Methods in Biomedical Imaging, February, 2010, the Institute for Pure and Applied Mathematics (IPAM), UCLA, USA.

• Plenary: the 11th Conference on Computational Mathematics of Chinese Universities, July, 2009, Guiyang, China.

• "Sparsity, Redundancy and Algorithm" Structured Decompositions and Efficient Algorithms, December, 2008, Dagstuhl Seminar, Saarbrücken, Germany.

• "Tight Frame Approach for Missing Data Recovery", the First International Conference on Frontiers in Computational Mathematics, December, 2008, Guilin, China.

• "Tight Frame Approach for Missing Data Recovery", Subdivision and Refinability, May, 2008, Pontignano, Siena, Italy.
• "A Framelet-based Image Inpainting Algorithm", The 3rd East Asia SIAM Conference, November, 2007, Xiamen, China
• "A Framelet-based Image Inpainting Algorithm", Trends in Applied Harmonic Analysis, September 2007, Banff International Research Station for Mathematical Innovation and Discovery, Alberta, Canada.
• "Unitary Extension Principle: Ten Years After", The Third International Conference on Computational Harmonic Analysis, June, 2007, Shanghai, China.
• "Deconvolution: A Wavelet Frame Approach", Time-frequency Analysis and Nonstationary Filtering, September, 2005, the Banff International Research Station, Alberta, Canada.
• "Deconvolution: A Wavelet Frame Approach", The International Workshop on Wavelet Frames, November, 2005, Daejeon, Korea.
• "Deconvolution: A Wavelet Frame Approach", The International Conference on Superresolution Imaging, August 2005, Hong Kong, China.
• "Wavelet Frames and Image Processing", The workshop on Noncommutative Computational Harmonic Analysis, The Special Semester on "Modern Methods of Time-Frequency Analysis", July 2005, Erwin Schrdinger Institute (ESI), Austria.
• "Unitary Extension Principle and Applications", The Workshop on Sparse Representation in Redundant System, May 2005, Maryland, USA.
• "Wavelet Frames and Applications", The Conference on "Wavelets and Splines", May 2005, Athens, USA.
•"Unitary Extension Principle and Applications", The Third International Congress of Chinese Mathematicians, December, 2004, Hong Kong, China.
• "Wavelet Algorithms for High Resolution Image Reconstruction", Applicable Harmonic Analysis, June, 2003, Banff International Research Station for Mathematical Innovation and Discovery, Alberta, Canada.
•"Wavelet Algorithms for High Resolution Image Reconstruction", 6th IDR Workshop: SC Marathon, November, 2002, Columbia, USA.
•" Wavelet Frames: Theory and Application", Surface Approximation and Visualization, February, 2002, Westport, New Zealand.
• "Wavelet Frames: Theory and Application", Joint IDR-IMA Workshop: Ideal Data Representation, April, 2001, IMA, Minnesota, USA.
• "Using Structured Matrices to Characterize Properties of Wavelets", Fourth SIAM Conference on Linear Algebra in Signals, Systems and Control, August, 2001 Boston, USA.
•"Frames in $L_2(R^d)$", The Third Asian Mathematical Conference, October, 2000, Manila, Philippines.

• " Tight Frames in $L_2(\mathbf{R^d})$", Surface Approximation and Visualization, Feb., 1999, Christ church, New Zealand.
• " Weyl Heisenberg Frames and Riesz Basis", Workshop on Wavelet and Multiresolution, November, 1999, Hong Kong, China.
• " Cardinal Interpolation", Workshop on Approximation Theory and Wavelet, May, 1998, Madison, USA.
• " Interpolatory Subdivision Schemes", Workshop on Multivariate Approximation and Interpolation with Application in CAGD, Signal and Image Processing, September, 1998, Eilat, Israel.
• "Tight Frames in $L_2(\mathbf{R}^d)$ ", Workshop on Wavelets and Their Applications May, 1997, Hong Kong, China.
• "Affine Frames ", International Conference on Harmonic Analysis and Wavelet Analysis, June, 1996, Beijing, China.
•"Multivariate Refinable Functions", A Series of Workshops on Spline Functions and the Wavelets Theory, Feb. 1996, Montreal, Canada.
• "Matrix Extension and Wavelet Construction", Wavelet Workshop, June, 1994, Edmonton, Canada.
•"Constructions of Wavelets and Pre-wavelets", Wavelets and Applications, 10th Annual Joint Summer Research Conferences in the Mathematical Sciences, June, 1992, Massachusetts, USA.
• "Solvability of Systems of Linear Operator Equations", Algebraic and Combinatorial Problems in Multivariate Approximation Theory, October. 1990, Oberwolfach Institute of Mathematics, Oberwolfach, Germany.

Colloquium/Seminar Talks

• Australia: Australian National U. (2002). • New Zealand: U. Auckland (1999, 2000).
• China: Academy of Math. and System Sciences, Chinese Academy of Science (2006, 2009); Beijing U of Aeronautics & Astronautics (2006, 2011); Beijing University of Technology, (2000, 2011) Chinese U. Hong Kong (2000); Chong Qing U.(1996, 2009); Fudan U. (2002, 2005, 2006, 2009); East China Normal U. (2002, 2006, 2007, 2008. 2009); Hohai U. (1996, 2011); Microsoft Research Asia, (2011); Nanjing U. (2004); National Center for Math. and Interdisciplinary Sciences, Chinese Academy of Science (2011); Peking U. (2006, 2009); Shanghai Jiaotong U. (2007, 2008, 2009); South China U. of Technology (2008); Southeast U. (2006); Southwest U. (2009); Sun Yat Sen U. (Zhongshan U.)(2004, 2005, 2008); Suzhou U (2005); Science and Technology U of China (2007, 2011); Taipei U (2007); Tsinghua U. (2009); Yangzhou U (2007); U. of Electronic Science and Technology (2009); Zhejiang U. (2004. 2005, 2006, 2007, 2009).
• Canada: U. Alberta,(1991, 1996, 1998, 2003); U. Calgary, (1991, 1996; 2005); U. Saskatchewan,(1991); U. Waterloo, (1993, 1996); U. Windsor (1993).

• France: Ecole Polytechnique (2000). • Germany: U. Duisburg (1991), U. Onsabruck (2008).
• U.S.A.: UC Irvine (2010); UCLA (2010); UC San Diego,(2010), Courant Institute, NYU, (2010), U. Maryland (2001); U. Oregon (1991); Penn State U. (2010), Princeton U. (2001, 2010); U. South Carolina (2001); Stanford U. (2010); Texas A&M U. (1993, 1998); Vanderbilt U. (1993, 2001); Wayne State U. (1993); UW-Madison (1991, 2001, 2010); UW-Milwaukee (1998); West Virginia U. (2002); Bell Labs Alcatel-Lucent (2012).

Talks at Conferences and Workshops in Singapore

• "Tight Frame Approach for Missing Data Recovery", Chinese-French-Singaporean Joint Workshop on Wavelet Theory and Applications, June 2008; • "Deconvolution: A Wavelet Frame Approach", Workshop on Mathematical Imaging and Digital Media, Jun 2008; • "Framelets and Imaging", International Workshop on Multiscale Analysis and Applications, December, 2006, (NTU); "Deconvolution: A Wavelet Frame Approach", Workshop on Mathematical Methods for Image Processing, August, 2005; • "Unitary Extension Principle and Applications", Wavelet Theory and Applications: New Directions and Challenges, August, 2004; • "Dual Gramian Analysis", Workshop on Functional and Harmonic Analysis of Wavelets and Frames, August, 2004; •" Wavelet Frame: Theory and Construction", Asian Approximation and Wavelet Theory, November, 2003; • "Wavelet Algorithms for High Resolution Image Reconstruction", Joint Workshop on Information Processing, October, 2003; • "Dual Gramian Analysis", Workshop on Time Frequency Analysis and Applications, September, 2003; • "Cardinal Interpolation and Biorthogonal Wavelets", Workshop on Wavelets and Fractals, May 2000; • "Approximation and Wavelet Theory", SMS and IPS Joint Workshop, February, 2000; • "Frames in $L_2(\mathbf{R}^d)$", Workshop on Mathematics and Information Processing, December, 1999; •"Affine Frames in $L_2(\mathbf{R}^d)$", Workshop on Medical Image, October, 1999.

Organizing Committee

• Organizer of Summer school/Workshop on medical images, July 2011, Shanghai Jiaotong University, China.
• Summer school on Data Sciences, July 2011, Fudan University, China.
• Member of the Scientific Committee of Workshop on Mathematical Aspect of Data Science, may, 2010, Fudan University, Shanghai, China
• Co-Chair of the Organizing Committee of the IMS (Institute of Mathematical Sciences, National University of Singapore) Program: Mathematical Imaging and Digital Media May-July 2008, including a summer school and two workshops.
• Member of the Scientific Committee of ISFMA Symposium on Wavelet Methods in Mathematical Analysis and Engineering from August August 2007, Zhuhai campus, Sun Yat-sen (Zhongshan) University, China.

• Member of the Scientific Committee of The Sixth SMAI-AFA Conference on "Curves and Surfaces" June/July, 2006, Avignon, France.
• Member of the Organizing Committee, The International Workshop on Wavelet Frames, November, 2005, Daejeon, Korea.
• Member and secretary of the Steering Committee of the Asian Mathematical Conference 2005.
• Co-Chair of the Organizing Committee of the IMS (Institute of Mathematical Sciences, National University of Singapore) Program: Mathematics and Computation in Imaging Science and Information Processing, July-December 2003, August 2004. The main organizer of three conferences, five workshops and eight tutorial sessions organized by the program.
• Member of the SIAM Committee to Solicit Mini-symposium Organizers for International Congress for Industrial and Applied Mathematicians, 2003.
• Organizer of "Wavelet Approximation and Applications" at The Fifth SMAI-AFA Conference on "Curves and Surfaces" June, 2002, Saint-Malo, France.
• Member of the Scientific Committee of The 2nd, 3rd and 4th International Conference on Wavelet Analysis and Applications, (2001, 2003, 2005), (Hong Kong, Chong Qing, Macau).
• Co-organizer of Workshop on Wavelets and Fractals, May 2000, Singapore.

Graduate Student Supervision:
• **PhD:** Suqi Pan (2010); Yuhong Xu (2009); Hou Liqun (2008-); Jia Li (2010-); Zeng Gong (2010-, co-supervisor); Junqi Zhou (2010-); Zhitao Fan, (2010-);
• **MSc:** Hui Ji (MSc 1998); Song Tao Liu (2000); Suqi Pan (2003); Anwei Chai (2005); Bin Dong (2005) (A winner of the Silver prize of the New World Mathematics Award for his Master Thesis on 17 December 2007 at the Fourth International Congress of Chinese Mathematicians (ICCM2007)); Siew Wee, Alvina Goh (Co-supervisor 2004).

Major Services at the National University of Singapore

University
• Member of University Promotion and Tenure Committee, 2004 (July)-2006 (June).

Faculty
• Faculty Research Committee, 2007-.
• Director of the Center for Wavelets, Approximation and Information Processing, 2002-present, (deputy director 1999-2001).
• Member of Faculty Promotion and Tenure Committee (Faculty of Science), 2002- 2004.
• Member of Faculty Academic Review Committee (Faculty of Science), 2001-2002.
• Member of Engineering and Science Program Committee, 2004-2005.

Department

• Deputy Head (Research) of Department of Mathematics 2006-2012.
• Member of Departmental Evaluation Committee for the annual review of 2003-2004, 2004-2005.
• Member of Executive Committee, Department of Mathematics 2000-2004, 2006-present.
• Divisional Head of the Applied Mathematics Division 1999-2000.