

## CURRICULUM VITAE OF ZUOWEI SHEN

### Personal

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### Education

University of Alberta (Canada)	(Ph.D. 1991)	1987-1991
Thesis Title: Two Studies on Functions of Several Variables		
University of Alberta (Canada)	(M.Sc. 1987)	1985-1987
Thesis Title: Birkhoff Interpolation by Chebyshevian Splines		
Hehai University (China)	(B.Sc. 1982)	1978-1982

### Professional Experience

Distinguished Professor		
National University of Singapore		2009-present
Professor		
Department of Mathematics, National University of Singapore		2002-present
Associate Professor		
Department of Mathematics, National University of Singapore		1998-2002
Senior Lecturer		
Department of Mathematics, National University of Singapore		1997- 1998
Lecturer		
Department of Mathematics, National University of Singapore		1993- 1997
Research Associate		
Center for the Mathematical Sciences		
University of Wisconsin-Madison		1991-1993

### Research Interests

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

### Awards and Honors

- 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.
- Outstanding Scientist Award, Faculty of Science, National University of Singapore, 2007.
- National Science Award of Singapore, 1998 (joint).
- University Researcher Award, the National University of Singapore, 1997.
- Andrew Stewart Graduate Prize for Doctoral Research, the University of Alberta, 1990.

### Member of Editorial Board

- Applied and Computational Harmonic Analysis, 2007–present
- Inverse Problems and Imaging, 2009–present
- Journal of Approximation Theory, 2001–present
- Journal of Computational Mathematics, 2007–present
- Journal of Fourier Analysis and Applications, 2007–present
- Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal, 2009–present
- International Journal of Numerical Analysis and Modeling, 2005–present
- International Journal of Tomography and Statistics, 2005–present
- International Journal of Wavelet, Multiresolution and Information Processing, 2004–present
- Journal of Wavelet Theory and Applications 2007–present
- Sampling Theory in Signal and Image Processing, 2005–present
- Guest Editor: Applied and Computational Harmonic Analysis, Special Issues on Mathematical Imaging, **23 (1)**, 2007; **24 (2)**, 2008

### Grants

- Principal investigator of an ARF grant R-146-000-113-112 (Singapore), 2008-2011.
- 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

- “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  $L_2(\mathbb{R}^d)$ ”, Wavelet and Integral Equation Program, June, 2000, Beijing, China.
- “Construction of wavelets ” and “ Frames and Stable Bases for Shift Invariant Subspaces of  $L_2(\mathbb{R}^d)$ ”, International Conference on Harmonic Analysis and Wavelet Analysis, June, 1996, Beijing, China.

### Plenary and Invited Talks

- “Redundant Systems and Image Restorations”, International Congress of Mathematicians August, 2010 (Section: Numerical Analysis and Scientific Computing), Hyderabad, India.
- “ Redundancy Sparsity and Algorithms for Image Restorations”, The Fifth Pacific Rim Conference of Mathematics, July 2010, Stanford University, USA.
- “ Redundancy Sparsity and Algorithms for Image Recovery”, Workshop on Mathematical Problems, Models and Methods in Biomedical Imaging, February, 2010, the Institute for Pure and Applied Mathematics (IPAM), UCLA, USA.
- “Redundancy, Sparsity and Algorithm”, 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 Super-resolution 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 Schrödinger 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: Beijing U of Aeronautics & Astronautics (2006); Chinese Academy of Science (2006, 2009); Chong Qing U.(1996, 2009); Fudan U. (2002, 2005, 2006, 2009); East China Normal U. (2002, 2006, 2007, 2008. 2009); Hohai U. (1996); Chinese U. Hong Kong (2000); Nanjing U. (2004) Peking U. (2006, 2009); Tsinghua U. (2009); Shanghai Jiaotong U. (2007, 2008, 2009); South China U. of Technology (2008); South West U. (2009); Southeast U. (2006); Suzhou U (2005); Science and Technology U of China (2007); Taipei U (2007); Yangzhou U (2007); Zhejiang U. (2004. 2005, 2006, 2007, 2009); Sun Yat Sen U. (Zhongshan U.)(2004, 2005, 2008).
- 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. Onsbbruck (2008).
- U.S.A.: U. Maryland (2001); U. Oregon (1991); Princeton U. (2001); U. South Carolina (2001); Texas A&M U. (1993, 1998); Vanderbilt U. (1993, 2001); Wayne State U. (1993); UW-Madison (1991, 2001); UW-Milwaukee (1998); West Virginia U. (2002).

### 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

- 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 (2003-); Yuhong Xu (2003-2009); Hou Liqun, (2008-).
- **MSc:** Hui Ji (MSc 1998); Song Tao Liu (2000); Suqi Pan (2003); Anwei Chai (2003-2005); Bin Dong (2003-2005) (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 2003-2004).

#### **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.