

CURRICULUM VITÆ

Shidong Li

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Education

Ph.D. in Applied Mathematics May, 1993
University of Maryland Graduate School, Baltimore
Dissertation: “The Theory of Frame Multiresolution Analysis and Applications”
Advisor: Professor **John J. Benedetto**.
M.S. in Applied Mathematics 1989
University of Maryland Graduate School, Baltimore
M.S. in Electrical Engineering (Digital Communications, Signal Processing) 1985
Graduate School, Chinese Academy of Science.
B.S. in Electrical Engineering (Automatic Control) 1982
Hefei University of Technology, China. Graduated with Distinct Honor Certificates.

Experience

Professor, San Francisco State University, 2005–present, Department of Mathematics.
Associate Professor, San Francisco State University, 2000–2005.
Assistant Professor, San Francisco State University, 1996–2000.
Honorary Professor, Graduate School of Chinese Academy of Sciences, 2004 - present.
Honorary Professor, Anhui University of Technology, 2002 - present.
Visiting Assistant Professor, University of Maryland, College Park, 1994–1996.
Department of Mathematics.
Visiting Assistant Professor, Dartmouth College, 1993–1994
Department of Mathematics and Computer Science
Visiting Scholar, Tokyo Institute of Technology, August, 2004, Oct., 2002, July - Aug.
of 1998, 1997 (continuing collaboration with Prof. Ogawa).
Visiting Scholar, The Technical University of Denmark, summer, 1999 (collaboration
with Prof. Christensen).
Visiting Scholar, Recipient of an award of the International Research Foundation, Tokyo
Institute of Technology, Summer, 1995.
Consultant, Air Force Institute of Technology, Radar signal classification, Sept., 1995–
June, 1996.
Consultant, Atlantic Aerospace Electronic Corporation, mathematical signal processing
in communication systems, 1995–July, 1996.
Lecturer, Graduate School, Chinese Academy of Sciences, 1985–1987.

Grants and Awards

NSF grant (U.S.A.) DMS-0709384 (4th), July, 2007 - June, 2010: Title: Development of Frame Extensions and Applications III.
NSF grant (U.S.A.) DMS-0406979 (3rd), August, 2004 - July, 2007: Title: Development of Frame Extensions and Applications II.
NSF grant (U.S.A.) DMS-0103762 (2nd), August, 2001 - July, 2004: Title: Development of Frame Extensions and Applications.
NSF grant (U.S.A.) DMS-9803679 (1st), June, 1998 - May, 2001: Title: Advanced Theories of Frames, Pseudo-frames, and Optimality Issues with Applications.
Affirmative Action Award, SFSU, springs, 1997, 1998, 1999, 2000 and 2001.
Presidential Award, SFSU, fall, 1998.
Vice President Assigning Time Award, SFSU, spring, 1997.
Summer Stipend Award, SFSU, summer, 1997.

New Preprints

Compact B-spline fundamental functions of reduced support, jointly with D. Ellis, E. Hayashi, draft, 2009.
Sparse dual frames and compact Gabor duals, jointly with M. Tie, preprint, 2009.
Frame fundamental superresolution image fusion from inhomogeneous measurements, jointly with Z. Yao and W. Yi, preprint, 2009.
On sampling related properties of B-spline Riesz sequences, jointly with Z. Tong and D. Yan, preprint, 2008.
Dimension invariance of finite frames of translates and Gabor frames, jointly with J. Cahill, preprint, 2008.
Parametric optimization of biorthogonal wavelets and filter banks via pseudoframes for subspaces, jointly with M. Hoffman, preprint, 2008.

Research Articles

Frame fundamental sensor modeling and stability of one-side frame perturbation, jointly with D. Yan, to appear in Acta Applicandae Mathematicae, 2009.
Fusion frames and distributed processing, jointly with P. Casazza and G. Kutyniok, Journal of Applied and Computational Harmonic Analysis, 25 (2008) 114-132.
Optimal noise suppression: a geometric nature of pseudoframes for subspaces, jointly with H. Ogawa, Journal of Advances in Computational Mathematics, 28(2008),141-155.
Density results on frames of exponentials, jointly with P. Casazza, O. Christensen and A. Linder, in Harmonic Analysis and Applications, C. Heil ed., Birkhauser, Boston, 2006.
Gabor duality characterizations, jointly with E. Hayashi, and T. Sorrells, in Harmonic Analysis and Applications, C. Heil ed., Birkhauser, Boston, 2006.
Pseudoframes for subspaces with applications, jointly with H. Ogawa, in Journal of Fourier Analysis and Applications, vol. 10, no. 4 (2004), 409-431.
Iterative irregular sampling for a generic subspace, in Journal of Sampling Theory in Signal and Image Processing, vol 3, no. 2 (2004), 101-117.
Proportional nonuniform multi-Gabor expansions, in Journal of Applied Signal Processing, vol 17, Dec. 2004.
On Riesz-Fisher sequences and lower frame bounds, jointly with P. Casazza, O. Christensen and A. Linder, in Zeitschrift fuer Analysis und ihre Anwendungen, Vol. 21 (2002)2, 305-314.
A theory of generalized multiresolution structure and pseudoframes of translates, in Journal of Fourier Analysis and Applications, Vol. 7, Issue 1 (2001), 23 - 40.
Pseudo-duals of frames with applications, jointly with H. Ogawa, in Applied and Computational Harmonic Analysis, 11 (2001), 289-304.

**Research
Articles
(cont'd)**

- Discrete Multi-Gabor Expansions, IEEE Trans. on Infor., Vol 45, No.6 (1999), 1954 - 1967.
- The theory of multiresolution analysis frames and applications in filter banks, jointly with John J. Benedetto, in Applied and Computational Harmonic Analysis, 5 (1998), 389-427.
- A parametric class of discrete Gabor expansions, IEEE trans. on Signal Processing, jointly with Dennis M. Healy, vol. 44, no. 2 (1996), 201-211.
- On general frame decompositions, Numerical Functional Analysis and Optimization, 16(9&10) (1995), 1181-1191.
- A discrete Gabor expansion with rational oversampling rate, jointly with S. Qian, in IEEE Trans. Signal Processing letters, Feb. (1995), 42-45.
- Optimal biorthogonal sequences for finite discrete Gabor expansion, jointly with S. Qian and K. Chen, in Signal Processing, vol. 27 (1992), 177-185.
- Analysis of a multilevel quantized digital phase-locked loop, Journal of China Institute of Communications, Vol.7, No.5, September, 1986, 25-34,42.

**Research
Works in
Progress**

- Optimal frames in data transmission, jointly with J. Cahill.
- Iterative construction of equal-angle uniform-norm Parseval frames via the dual frame formula
- Iterative construction of equal-norm tight frames via the dual frame formula, jointly with M. Hirouchi.
- Array synthesis in radio astronomy and radar/wireless communications.
- Duals of flexible supports to B-spline Riesz sequences, jointly with C. Cabrelli and U. Molter.
- Compact and optimal Gabor dual functions and dual space analysis, joint work with E. Hayashi, T. Long.
- Incorporating maximum coding gain into biorthogonal wavelet design with optimal regularities, joint work with M. Herman.
- Fast Fourier transform of functions of singularities via generalized multiresolution structure, jointly with H. Liao.
- Noise suppression in frame decompositions via alternative dual and pseudo-dual frames.
- Commutative pseudoframes for subspaces, jointly with H. Ogawa.
- A nonorthogonal approach to linear deconvolution problems using pseudoframes for subspaces.
- Irregular wavelets: a pseudoframe approach.
- An iterative sampling formulation via the theory of pseudoframes.

**Invited
Lectures**

- Frame and pseudoframe approach to signal and image processing (a 20 hour graduate seminar series), Graduate School of the Chinese Academy of Sciences, Summers, 2009, 2008.
- Advances of frames and pseudoframes with applications (a 20 hour graduate seminar series), Graduate School of the Chinese Academy of Sciences, Summers, 2007, 2006, 2005, 2004.

- Invited Talks** Image fusion, one-sided frame perturbation and a dimension invariance principle, BIRS International Workshop on "Frames from the first principle", Banff, Alberta, Canada, March 15-20, 2009.
- Pseudoframes and fusion frames with applications, Intern. Conf. on Applied Harmonic Analysis, Beijing, China, June 16-19, 2006.
- Case studies of pseudoframe applications, BIRS International Workshop on "Coarsely Quantized Redundant Representations of Signals", Banff, Alberta, Canada, March 11-16, 2006.
- Extensions of frames and applications, University of Alberta, Canada, March 17, 2006.
- Dual and pseudo-dual frames in various systems, Intern. Conf. on Harmonic Analysis and Applications, joint meeting with the 8th Encuentro Nacional de Analistas, A.P.Calderon, Villa de Merlo, San Luis, Argentina, July 30 - August 5th, 2006.
- Frame and pseudoframe applications: tight frame constructions, tight pseudoframes, and all that, Intern. Conf. on Applicable Harmonic Analysis: Approximation and Application, Beijing, Chian, June 17 -21, 2006.
- Pseudoframes and Applications, Nankai University, Tianjing, China, July, 2005
- Frames and Signal Processing, Graduate School, Chinese Academy of Science, Oct., 2002.
- Theory of Frames and Signal Processing, Hefei University of Technology, Oct., 2002.
- Theory of Frames and Applications, Anhui University of Technology, Oct., 2002.
- Frames and Signal Processing, Institute of Acoustic and Speech, Chinese Academy of Science, June., 2002.
- Wavelet Basics and Applications, Stanford University, Linear Acceleration Center, July, 2000.
- Wavelets and Applications, Sonoma State University, Feb, 1998.
- Multi-Gabor Time-frequency Analysis, Princeton University, March, 1996.
- A Theory of Pseudo Wavelet-frames and Generalized Multiresolution Structures with Applications, George Mason University, Department of Mathematical Sciences, Feb., 1995.
- A General Theory of Discrete Gabor Expansions and A Parametric Algorithm, The LNK Inc., Maryland, March, 1995.
- A Theory of Multiresolution Frames and Applications, National Institute of Health, Mathematics Group of Biomedical Engineering Instrument Program (BEIP), May, 1993.

- Conference** *Optimal finite frames with maximum erasures*, jointly with J. Cahill, to be presented in conference on Time-frequency Methods, Strobl, Austria, June 14 -20, 2009.
- Research**
- Presentations** *Modelling sensor networks with fusion frames*, jointly with P. Casazza, G. Kutyniok and C. Rozell, in *Proced. of SPIE'2007*, conference on Wavelets XIII, San Diego, Aug., 2007.
- Biorthogonal wavelets with maximum coding gain*, jointly with M. Herman, in *Proced. of SPIE'2006*, conference on Advanced Signal Processing, San Diego, Aug., 2006.
- Compactly supported smooth duals of B-spline Riesz sequences of translates: a simple formula and the calculus*, AMS regional conf., Eugene, Oregon, Nov. 11-13, 2005.
- Biorthogonal wavelets via pseudoframes for subspaces*, jointly with M. Hoffman, in *Proced. of SPIE'2005*, conference on Wavelets XI, San Diego, July 31 - Aug. 3, 2005.
- Efficient image compression by optimized biorthogonal wavelets*, jointly with M. Hoffman, in *Proced. of SPIE'2005*, conference on Mathematics of Data/image Coding, Compression, and Encryption VIII, with Applications, San Diego, July 31-Aug. 3, 2005.
- Optimal noise suppression: A nonorthogonal geometric nature of pseudoframes for subspaces*, third workshop on Non-orthogonal Expansions and Greedy Algorithms, ESI(The Erwin Schrödinger Institute), Vienna, Austria, June 6-11, 2005.
- A nonorthogonal approach through pseudoframes for subspaces and applications*, Intern. Conf. Modern Methods of Time-frequency Analysis, Strobl, Austria, May 23 -28, 2005.
- New biorthogonal wavelets and filterbanks via the theory of pseudoframes*, SampTA03 (the 3rd sampling application symposium), Vienna, Austria, May 26 - 30, 2003.
- Pseudoframes for subspace: geometric properties and applications*, SampTA03 (the 3rd sampling application symposium), Vienna, Austria, May 26 - 30, 2003.
- Filterbank constructions via the theory of pseudoframes*, International congress on industrial and applied mathematics, Sydney, Australia, July 6-11, 2003.
- Applications of nonuniform multi-Gabor expansions in time-frequency analysis*, jointly with M. Hoffman, in *Proced. of SPIE'2003*, conference on Advanced Signal Processing, San Diego, Aug. 3, 2003.
- Incorporating Multiple Orientations and Localizations in Multi-Gabor Frames for Image Processing*, First SIAM Conference on Imaging Science, Boston, March 3-6, 2002.
- Some practices of irregular samplings*, jointly with M. Begonia, in *Proced. of SPIE'2001*, conference on Advanced Signal Processing, San Diego, Aug. 1, 2001.
- An irregular sampling algorithm for general subspaces*, in *Proced. of SPIE'2000*, conference on Wavelet Applications and Mathematical Imaging VIII, San Diego, July 31, 2000.
- Pseudoframes and thoughts on its applications*, presented at D. Gabor Centenary Conference, Vienna, Austria, May 29-31, 2000.
- Irregular sampling conditions*, presented at the Conf. on Harmonic Analysis and Applications, Oct. 7-9, College Park, Maryland, 1999.
- Subspace signal expansions with off-the-space sequences and applications*, presented at the Intern. Congress of Indust. and Applied Math., July 5-9, Edinburgh, Scotland, 1999.
- An irregular sampling formulation via the theory of pseudoframes*, presented at the SIAM annual meeting, May 15, Atlanta, Georgia, 1999.
- Multi-Gabor Representations with Nonuniform Time and Frequency Shifts with Applications*, *Proced. of CISS'98*, 32nd Annual Conference on Information Sciences and Systems, Princeton University, March 18 - 20, 1998.

- Conference Presentations (cont'd)**
- Pseudoframes for subspaces with applications*, in *Proced. of SPIE'98, conference on Wavelet Applications and Mathematical Imaging VI*, San Diego, July 22, 1998.
- Image representation and compression through adaptive multi-Gabor representations*, in *Proced. of SPIE'98, conference on Mathematics of Data/Image Coding, Compression, and Encryption*, San Diego, July 21, 1998.
- Two Dimensional Multi-Gabor Representations*, *Proced. of SPIE'97, conference on Wavelet Applications and Mathematical Imaging*, San Diego, July, 1997.
- On pseudo frames*, talk given at *American Mathematical Regional Meeting*, College Park, MD, April, 1997.
- Time-frequency analysis via multi-Gabor expansions*, talk given at the *46th SIAM Annual Meeting*, Stanford University, July, 1997.
- Scaled Gabor Representations: A new approach of time-frequency decompositions*, *Proced. of SPIE'96, conference on Wavelet Applications*, Denver, Aug, 1996.
- On the construction of wavelet-frames with filter-bank-structured fast algorithm and applications*, presented at *Conf. on Inform. Sci. and Systems*, Johns Hopkins University, Baltimore, March, 1995.
- Theory of discrete Gabor expansions: a parametric formula for all Gabor analysis waveforms and optimality issues*, presented at *Conf. on Inform. Sci. and Systems*, Johns Hopkins University, Baltimore, March, 1995.
- Wavelet-frames with fast algorithm and its applications to data compression and noise suppression*, *Proced. of SPIE'95 Conference on Wavelet Applications*, San Diego, July, 1995.
- A fast and parametric algorithm for discrete Gabor expansions and the role of various dual windows*, *Proced. of SPIE'95 Sympo. on Wavelet Applications for Dual Use*, Orlando, April, 1995.
- Subband coding and noise reduction in multiresolution analysis frames*, jointly with John J. Benedetto, *Proced. SPIE'94 Mathematical Imaging: Wavelet Application conference*, San Diego, July, 1994.
- Applications of time-frequency bases to multiple access fiber optic communication systems*, *Proceeding of SPIE Internl. Symp. on Opt. Eng. in Aerospace Sensing: Wavelet Applications*, Orlando, April 4-8, 1994, jointly with T. Olson, D. Healy, U. Osterberg, pp42-53.
- Narrow band frame multiresolution analysis with perfect reconstruction*, jointly with John J. Benedetto, *Proced. IEEE-SP Internl. Symp. TF-TS*, Philadelphia, Oct, 1994.
- A general theory to discrete Gabor expansion*, *Proced. of SPIE'94 Mathematical Imaging: Wavelet Application Conference*, San Diego, July, 1994, also in preprint.
- A generalized multiresolution structure and associated multirate systems*, *Proced. IEEE-SP Internl. Symp. TF-TS*, Philadelphia, Oct, 1994.
- A generalized non-separable 2-D discrete Gabor expansion for image representation and compression*, *Proced. of the 1st IEEE Internl. Conf. on Image Processing*, Austin, Texas, November, 1994.
- On a class of discrete Gabor expansions*, *Proceeding of SPIE Internl. Symp. on Opt. Engin. in Aerospace Sensing: Wavelet Applications*, Orlando, April 4-8, 1994, jointly with D. Healy, pp830-841.
- Multiresolution analysis frames with applications*, *Proced. of IEEE internl. conf. ASSP*, Minnesota, April, 1993, Vol. 3, jointly with John J. Benedetto, pp. 304-307.
- On frames and filter banks*, *Proced. Conf. on Inform. Sci. and Systems*, Johns Hopkins University, Baltimore, March, 1993, jointly with John J. Benedetto.
- An optimized backpropagation with minimum norm weights*, *Proced. of Intern. Joint Conf. on Neural Networks*. San Diego, 1990, pp 697-702.

Panelist Served on the US NSF Applied Mathematics CAREER Panel, 2005.

Professional Services Served as a reviewer for the following journals:
Applied and Computational Harmonic Analysis
Journal of Fourier Analysis and Applications
IEEE Transactions on Signal Processing
Signal Processing
Journal of Applied Signal Processing
International Journal of Wavelets and Applications
Journal of Sampling Theory in Signal and Image Processing
Journal of Integral Equations and Operator Theory
Science, China

Professional Membership Member of Mathematical Association of America.
Member of the International Society of Optical Engineering.
Member of Institute of Electrical and Electronics Engineering (IEEE)