CURRICULUM VITAE

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Areas of Research Interest

- Numerical analysis and scientific computing.
- Computations of partial differential equations and stochastic differential equations.
- Wavelets and PDE based image processing.
- Level set methods.

Education

- Ph.D., Applied Mathematics, University of California, Los Angeles, U.S.A., June, 2000 (Thesis advisor: Professor Tony F. Chan. Title of thesis: *Wavelet Transforms and PDE Techniques in Image Compression*).
- M.Phil., Mathematics, The Chinese University of Hong Kong, Hong Kong, August, 1996
- M.S., Applied Mathematics,
  - The University of California, Los Angeles, June, 1998.
  - Peking University, Beijing, China, July, 1994
- B.S., Pure Mathematics, Peking University, Beijing, China, July, 1991.

Academic Positions

- Assistant Professor, School of Mathematics, Georgia Institute of Technology, August, 2003 – present.
- Postdoctoral Scholar and von Kármán instructor, Applied and Computational Mathematics Department, California Institute of Technology, July, 2000 – August, 2003.
- Postdoctor Scholar, Core Participant in Geometrically Based Motions Program, Institute for Pure and Applied Mathematics, UCLA, March, 2001 – June, 2001.

Professional Experience

- Assistant Professorship at School of Mathematics, Georgia Institute of Technology, August 2003–present. Courses taught: Honors differential equations, Stochastic Processes I, Linear algebra, Calculus II, Differential Equations, Math Methods in Applied Science, Iterative Methods for Systems of Equations, Numerical Analysis I, Numerical Linear Algebra, Numerical Mathods for ODE's.

- Instructorship at Applied and Computational Mathematics Department, California Institute of Technology, Jan. 2001 – Sept. 2002. Couses taught: Numerical Analysis (a three-quarter graduate courses, including Approximation Theory and Numerical ODE's, Numerical Linear Algebra, Numerical PDE's.
- Summer internship at Level Set Systems, Inc., developed code for "Level set based image processing", 1999.
- Graduate research assistant at the University of California, Los Angeles, 1996 – 2000.
- Graduate teaching assistant at
  - The University of California, Los Angeles, during the academic years 1997 – 1998, and 1998 – 1999. Undergraduate courses taught: Linear Algebra, Numerical Analysis and Program in Computing (intermediate programming in C++).
  - The Chinese University of Hong Kong, during the academic years 1994 – 1996. Undergraduate courses taught: Numerical Analysis, Linear Programming, Dynamic Programming, Mathematical Softwares in Scientific Computing.
  - Peking University, Beijing, China, during the academic years 1991 – 1992. Undergraduate courses taught: Calculus, Linear Algebra.

Awards and Grants

- NSF Faculty Early Career Development (CAREER) Award: *Computing Information in Image Processing and Stochastic Differential Equations*, supported by NSF DMS, Award #0645266, starting date: July 1, 2007.
- NSF Grant: *PDE Techniques in Wavelet Based Image Processing*, supported by NSF DMS-Computational Mathematics, Award #0410062, Starting date: September 1, 2004.
- Honorable Mention in Householder Award XI(2002), awarded by the Householder Prize Committee, for Ph.D dissertation *Wavelet Transforms and PDE Techniques in Image Compression*, written at UCLA under the supervision of Professor Tony Chan.
- Guang Hua award, 1990, Peking University.
- Jiu Zhang award, 1992, Peking University.

Patents

(1) U.S. Provisional Patent Application for *Efficient Modeling of Spatially Incoherent Sources based on Wiener Chaos Expansion Method*, with A. Adibi, M. Badieirostami and Shui-Nee Chow.
(2) U.S. Patent Ser No. 7031538 (Application No. 09/737,834) for *Method and Apparatus for Feature Based Quantization and Compression of Data*, with L.T. Cheng, B. Merriman, S. Osher and H. Zhao.

Journal and Invited Publications

(1) S. N. Chow, W. X. Shen and H. M. Zhou, *Dynamical Order in Systems of Coupled Noisy Oscillators*, accepted by J. of Dynamics and Differential Equations.
(2) T. Chan, Y. Wang and H. M. Zhou, *Denoising Natural Color Photos in Digital Photography*, submitted to IEEE Transcation on Image Processing.
(3) A. Adibi, M. Badieirostami, H. M. Zhou and S. N. Chow, *Efficient Simulation of Diffuse Light for the Analysis of Photonic Crystal Structures*, submitted to Optics Letter.

(4) S. Jain, P. Tsiotras and H. M. Zhou, *Adaptive Multiresolution Mesh Refinement for the Solution of Evolution PDE's*, submitted to SIAM J. Scientific Computing.
(5) Tony F. Chan and H. M. Zhou, *Total Variation Wavelet Thresholding*, accepted by the J. of Scientific Computing.
(6) S-N Chow and H. M. Zhou, *An Analysis of Phase Noise and Fokker-Planck Equations*, accepted by the J. of Differential Equations.
(7) Y. Wang and H. M. Zhou, *A Total Variation Wavelet Algorithm for Medical Image Denoising*, the International Journal on Biomedical Imaging, Volume 2006, article ID 89095, 6 pages, 2006. doi:10.1155/IJBI/2006/89095.
(8) T. Hou, W. Luo, B. Rozovskii and H. M. Zhou, *Wiener Chaos Expansions and Numerical Solutions of Randomly Forced Equations of Fluid Mechanics*, J. of Computational Physics, 217 687-706 (2006).
(9) Tony F. Chan, J. Shen and H. M. Zhou *Total Variation Wavelet Inpainting*, Journal of Mathematical Imaging and Vision, Vol 25, Number 1/July, 2006, 107-125.
(10) Tony F. Chan, H. M. Zhou and T. Zhou, *A Recovery Bound for H^1 Based Wavelet Interpolations*, in the proceeding to the international conference on PDE-Based Image Processing and Related Inverse Problems. Oslo, Norway, Aug 8-12, 2005.
(11) T. Hou, H. Kim, B. Rozovskii and H. M. Zhou, *Wiener Chaos Expansions and Numerical Solutions of Randomly Forced Equations of Fluid Mechanics*, the HERMIS Journal, the international journal of computer mathematics and its applications, vol. 4, 2004.
(12) Tony F. Chan and H. M. Zhou, *ENO-wavelet Transforms and Some Applications*, in the book *Beyond Wavelets*, editored by J. Stoeckler and G. V. Welland, Academic Press (2003).
(13) Tony F. Chan and H. M. Zhou, *ENO-wavelet Transforms for Piecewise Smooth Functions,* SIAM J. Numer. Anal. Vol 40, No. 4 (2002), 1369–1404.
(14) R. H. Chan, S. F. Xu, and H. M. Zhou, *On the Convergence Rate of a Quasi-Newton Method for Inverse Eigenvalue Problems*, SIAM J. Numer. Anal., 36 (1999), 436–441.

Reviewed and Invited Conference Proceedings

(15) M. Badieirostami, A. Adibi, H. M. Zhou and S. N. Chow, *Efficient modeling of spatially incoherent sources based on Wiener chaos expansion method for the analysis of photonic crystal spectrometer,* in the Proceedings of SPIE, Vol 6480, doi:10.1117/12.717273, Feb, 2007.
(16) A. Adibi, M. Badieirostami, H. M. Zhou and S. N. Chow, *Fast and Efficient Simulation of Diffuse Light Using Wiener Chaos Expansion and its Applications for Design of Photonic Crystal Spectrometers,* submitted to Conference on Lasers and Electro-Optics.
(17) A. Adibi, M. Badieirostami, H. M. Zhou and S. N. Chow, *Fast and Efficient Simulation of Diffuse Light Using Wiener Chaos Expansion for the Analysis of Inhomogeneous Optical Structures,* submitted to the Fifth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory.
(18) Tony F. Chan, J. Shen and H. M. Zhou, *A Total Variation Wavelet Inpainting Model with Multilevel Fitting Parameters*, in the Proceedings to the SPIE Symposium on Advanced Signal Processing: Algorithms, Architectures and Implementations VIII, Vol. 6313, San Diego, CA, August, 2006, Ed: F. Luk.

(19) D. Dugatkin, H. M. Zhou, T.F. Chan and M. Effros, *Lagrangian Optimization of a Group Testing for ENO Wavelets Algorithm*, in the proceeding to the 2002 Conference on Information Sciences and Systems, Princeton University, March 20-22, 2002.

(20) Tony F. Chan and H. M. Zhou, *Total Variation Improved Wavelet Thresholding in Image Compression*, Proceedings to the 2000 International Conference on Image Processing, Vancouver, BC, Canada, Sept. 10-13, 2000.

(21) Tony F. Chan, H. M. Zhou, *Adaptive ENO-wavelet Transforms and Its Application in Image Compression*, Proceedings to the 12th International Conference on Domain Decomposition Methods, Chiba University, Chiba, Japan, Oct. 25-29, 1999.

(22) Tony F. Chan, H. M. Zhou, *Feature Preserving Lossy Image Compression Using Nonlinear PDE's,* in the Proceedings to the SPIE Symposium on Advanced Signal Processing: Algorithms, Architectures and Implementations VIII, Vol. 3461, San Diego, CA, July, 1998, Ed: F. Luk.

(23) Tony F. Chan, H. M. Zhou, R.H. Chan, *Continuation Method for Total Variation Denoising Problem*, in the Proceedings to the SPIE Symposium on Advanced Signal Processing: Algorithms, Architectures and Implementations, Vol. 2563, San Diego, CA, July, 1995, Ed: F. Luk.

Other Publications

(24) T. Hou, H. Kim, B. Rozovskii and H. M. Zhou, *Wiener Chaos Expansions and Numerical Solutions of Randomly Forced Equations of Fluid Mechanics*, in the proceedings to the 6th Hellenic European Conference on Computer Mathematics and its Applications, Athens, Greece, Sept. 25-27, 2003.

(25) Tony F. Chan and H. M. Zhou, *Optimal Construction of Wavelet Coefficients Using Total Variation Regularization in Image Compression*, CAM report 00-27, Mathematics Department, UCLA, July, 2000.

(26) Tony F. Chan, H. M. Zhou, *Adaptive ENO-wavelet Transforms for Discontinuous Functions,* CAM report (99-21), Math. Dept., UCLA, July, 1999.

(27) Z.H. Teng and H. M. Zhou, *The L_1 Convergence Rate of Particle Method for Scalar Conservation Laws*, Master thesis, Math. Dept., Peking University, China, 1994.

Conference Participation

- **Conference Organization**
  (1) *Recent Developments in Computation and Analysis of Wave Propagation and Application in Optics*, minisymposium in the SIAM Conference on Analysis of Partial Differential Equations, Dec 10-12, 2007, Mesa AZ, (with Chiu-Yen Kao and Richard Tsai).
  (2) *Recent Developments in Total Variation Based Models*, minisymposium in the SIAM Conference on Imaging Science, May 15-17, 2006, Minneapolis, Minnesota (with Tony Chan and Selim Esedoglu).
- **Invited Talks**
  – *Wiener Chaos Expansions and Stochastic Maxwell Equations in Photonic Crystal*, International Conference on Spectral and High Order Methods (ICOSAHOM07), Beijing, China, June 18-22, 2007.

- *Total Variation Wavelet Inpainting*, The Third International Conference on Computational Harmonic Analysis, Fudan University, Shanghai, China, June 18-22, 2007.
- *Fast Numerical Methods Based on Wiener Chaos Expansions for Stochastic Maxwell Equations*, International Workshop on Multiscale Analysis and Applications, Nanyang Technological University, Singapore, Dec. 18-22, 2006.
- *A Total Variation Wavelet Inpainting Model with Multilevel Fitting Parameters*, the SPIE Symposium on Advanced Signal Processing: Algorithms, Architectures and Implementations VIII, San Diego, CA, August, 2006.
- *An analysis of phase noise and its Fokker-Planck equations*, minisymposium: Evolutionary Differential Equations and Applications in 12th International Conference on Statistics, Combinatorics, Mathematics and Applications (SCAM), Auburn, Alabama, Dec 2-4, 2005.
- *Total Variation Wavelet Inpainting*, PDE-Based Image Processing and Related Inverse Problems, CMA, Oslo, Norway, Aug 8-12, 2005.
- *An Analysis of Phase Noise and Fokker-Planck Equations*, International Conference on Multiscale Modeling and Scientific Computing in Honor of Professor B. Engquist's 60th Birthday, Beijing, June 10-12, 2005.
- *ENO-Wavelet Transforms and its Applications in Image Compression*, International Conference on Applicable Harmonic Analysis, CMS, Zhejing University, HongZhou, May 23-27, 2005.
- *Total Variation Wavelet Inpainting*, SIAM-SEAS 2005, Charleston, SC, March 25-26, 2005.
- *Lagrangian Optimization of a Group Testing for ENO Wavelet Algorithms in Image Compression*, AMS-SIAM Special Session on Math. Image Proc. (MIP), AMS-SIAM-MAA joint annual meeting, Atlanta, GA, Jan 5-9, 2005.
- *Total Variation Models for Wavelet Based Image Processing*, Workshop on Image Processing and Computer Vision/Graphics, Center of Mathematical Sciences, Zhejiang University, Hang Zhou, China, Dec. 20-24, 2004.
- *The PDE and Variational Techniques in Wavelet Transforms and Their Applications in Image Processing*, Mathematical Image Analysis and Processing Workshop, Banff International Research Station for Mathematical Innovation and Discovery, Banff, Alberta, Canada, Oct. 23-28, 2004.
- *Total Variation Models for Wavelet Based Image Inpainting*, AIMS' Fifth International Conference on Dynamical Systems and Differential Equations, California State Polytechnic University, Pomona, CA, June 16-19, 2004
- *Variational PDE Techniques in Wavelet Based Image Compression*, IPAM Inverse Problems Workshop Series I, UCLA, Los Angeles, California, October 16-23, 2003.
- *Optimal Construction of Wavelet Coefficients by Minimizing Total Variation in Image Processing*, IPAM Geometrically Based Motions Reunion Conference, Sept. 16-20, 2002, Lake Arrowhead, California.
- *Compression of Piecewise Constant Level Set Images Using ENO Wavelets*, Invited Presentation at the Special Session on Level Set Methods in the SIAM 50th Anniversary Meeting, Philadelphia, PA, July 7-12, 2002.

• **Contributed Talks:**

  - *Adaptive ENO-wavelet Transforms for Image Compression*, Contributed talk in the IMA workshop on Image Processing and Low Level Vision, Institute of Mathematics and Applications, University of Minnesota, Minneapolis, Oct 16-22, 2000.
  - *Feature Preserving Lossy Image Compression Using Nonlinear PDE's* 25 minutes, SPIE conference on Advanced Signal Processing Algorithms, Architectures, and Implementations VIII, San Diego, California, July 1998.
- **Posters:**
  - *Total Variation Improved Wavelet Thresholding in Image Compression*, the 2000 International Conference on Image Processing, Vancouver, BC, Canada, Sept. 10-13, 2000.
  - *Feature Preserving Lossy Image Compression Using Nonlinear PDE's,* the Data Compression Conference, March, 1998, Snowbird, Utah. Organizers: J.A. Storer and M. Cohn.
- **Participated:**
  - Newton Institute Conference: Effective Computational Methods for Highly Oscillatory Problems: The Interplay between Mathematical Theory and Applications, Newton Institute, Cambridge University, Cambridge, UK, July 2-6, 2007.
  - Second Internatioanl Conference on Computational Harmonic Analysis, Nashville, Tennessee, May 24-30, 2004. Joint work *the PDE and Variational Techniques in Wavelet Transforms and Their Applications in Image Processing* was presented by T. F. Chan.
  - Mathematics in Imaging, MSRI, Berkeley, Nov 1-5, 1999, Organizers: F. A. Grunbaum and G. Ulhmann. Supported by MSRI. Paper *Adaptive ENO-wavelet Transforms for Discontinuous Functions* presented by T. F. Chan.

Invited Lectures

- *Variational Models and PDE Techniques in Wavelet Inpainting*, Applied Math Colloquium, Department of Mathematics, University of California, San Diego, May 8, 2007.
- *Wiener Chaos Expansions and Stochastic Maxwell Equations in Photonic Crystal Spectormeter Design*, Scientific Computing Seminar, Division of Applied Mathematics, Brown University, Providence, RI, May 2, 2007
- *Wiener Chaos Expansions and Stochastic Maxwell Equations in Photonic Crystal*, Applied Math Seminar, Department of Mathematics, University of Texas, Austin, April 5, 2007.
- *Variational Models and PDE Techniques in Wavelet Inpainting*, Department of Mathematics, University of Georgia, Athens, March 2, 2007.
- *Variational Models and PDE Techniques in Wavelet Inpainting*, Center for Scientific Computation and Mathematical Modeling, University of Maryland, College Park, Feb 8, 2006
- *Phase Noise Analysis and its Applications*, The Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, July 4, 2005.
- *An Analysis of Phase Noise and Fokker-Planck Equations*, School of Mathematical Sciences, Peking University, June 3, 2005.
- *Total Variation Based Wavelet Image Processing*, Department of Mathematics, Georgia Southern University, Feb 25, 2005.

- *Total Variation Models for Wavelet Based Image Processing*, School of Mathematical Sciences, Peking University, Dec 25, 2004.
- *Efficient Numerical Computations of Stochastic Partial Differential Equations*, Applied Mathematics Seminar, Department of Mathematics, University of California, Davis, April 25, 2003.
- *Variational PDE Techniques in Wavelet Transforms and Image Processing*, Computational and Applied Mathematics Seminar, Department of Mathematics, University of California, Irvine, April 7, 2003.
- *The Adaptive ENO Wavelet Transform and its Application in Image Compression*, Numerical Analysis Senimar, Department of Mathematics, University of California, San Diego, June 4, 2002.
- *Lagrangian Optimization of a Group Testing for ENO Wavelet Algorithms for Image Compression*, Applied Mathematics Colloquium at Department of Mathematics, University of California, Los Angeles, May 14, 2002.

Membership

- Society of Industial and Applied Mathematics, 2001 – present.
- American Mathematical Society, 1996 – present.
- Society for Photo-Optical Instrumentation Engineers, 1998 – 1999

Editorial Work

- Appointed as a managing editor for the journal *Inverse Problems and Imaging* (IPI) by American Institute of Mathematical Sciences (AIMS) effectively Jan. 2008.

Referee for journals

- J. Computational Harmonic Analysis,
- J. on Computational Physics,
- SIAM J. Applied Mathematics,
- SIAM J. Numerical Analysis,
- SIAM J. Scientific Computing,
- International J. on Biomedical Imaging,
- IEEE Transactions on Signal Processing,
- Mathematical Modelling and Numerical Analysis,
- Numerical Algorithms (Netherland).
- Peer Review or Panelist for NSF, Netherlands Organization for Science Research.