

# Curriculum Vitae

Naoki Saito

## Business Address:

Department of Mathematics  
University of California  
One Shields Avenue  
Davis, CA 95616-8633  
Voice: (530) 754-2121  
Fax: (530) 752-6635  
Email: [saito@math.ucdavis.edu](mailto:saito@math.ucdavis.edu)

## Education

**B.Eng.** Department of Mathematical Engineering and Information Physics, University of Tokyo, 1982  
Thesis Title: “Dynamical Pattern Formation and Computer Graphics”

Advisor: Jin-ichi Nagumo

**M.Eng.** Department of Mathematical Engineering and Information Physics, University of Tokyo, 1984  
Thesis Title: “On the Behavior of Pulses on the Parallel Active Lines”

Advisor: Jin-ichi Nagumo

**Ph.D.** Department of Mathematics, Yale University, 1994

Thesis Title: “Local Feature Extraction and Its Applications Using a Library of Bases”

Advisor: Ronald R. Coifman

## Appointments

**2007–:** Chair, Graduate Group in Applied Mathematics (GGAM), University of California, Davis.

**2001–:** Professor, Department of Mathematics, University of California, Davis.

**1997–2001:** Associate Professor, Department of Mathematics, University of California, Davis.

**1994–97:** Research Scientist, Schlumberger-Doll Research, Ridgefield, CT.

**1986–94:** Associate Research Scientist, Schlumberger-Doll Research, Ridgefield, CT.

**1984–86:** Software Development Engineer, Nippon Schlumberger K.K., Fuchinobe, Japan.

## Honors

Marquis Who’s Who in America, 2008–present.

Presidential Early Career Award for Scientists and Engineers (PECASE), Oct. 2000.

Office of Naval Research Young Investigator Award, Feb. 2000.

Election to Senior membership of IEEE, Dec. 1999.

The Henri G. Doll Award (the highest honor in the technical papers within the Schlumberger organization), Jun. 1997.

Best Paper Award for the Wavelet Applications in Signal and Image Processing II, SPIE - The International Society for Optical Engineering, International Symposium, Jul. 1994.

**Grants**

- Completed:** “Fractographic Analysis of High-Cycle Fatigue in Aircraft Engines,” Research Contract from SRI International as a part of US Air Force Office of Scientific Research, Contract No. F49620-98-C-0041, 10/01/98–12/31/99. Total Award Amount: \$ 83,004.
- Completed:** “Signal Demixing Using Least Statistically-Dependent Bases and Related Techniques,” Research Contract from Raytheon Corp., Tucson, AZ. Period: 03/01/00-2/28/01. Total Award Amount: \$36,491.
- Completed:** “Probabilistic Modeling and Computational Methods in Environmental Statistics,” (jointly with R. A. Levine and D. F. Layton), Statistics Program, NSF, and Environmental Research Program, EPA, Award No. DMS-9978321. Period: 09/15/99–08/31/02. Total Award Amount: \$99,600.
- Completed:** “Efficient Description, Modeling, and Recognition of Natural Imagery via a Local Basis Library,” Computational Mathematics Program, NSF, Award No. DMS-9973032. Period: 08/15/99–07/31/03. Total Award Amount: \$70,100.
- Completed:** “Robust Object Signature Definition using Vector-Valued Sensor Data,” ONR Young Investigator Award. N00014-00-1-0469. Period: 06/01/00-05/31/03. Total Award Amount: \$300,000.
- Completed:** “Scientific Computing Research Environments for the Mathematical Sciences (SCREMS),” (jointly with A. Cheer, Z. Bai, E. G. Puckett, S. Shkoller), NSF, Award No. DMS-0079760. Period: 09/05/00-08/31/03. Total Award Amount: \$199,993.
- Completed:** “Image Processing and Analysis on a Circular Domain,” UC Davis Faculty Research Grant. Period: 07/01/03-06/30/04. Total Award Amount: \$4,000.
- Completed:** “Polyharmonic Local Sine Transform and Its Applications in High-Dimensional Data Processing,” Presidential Early Career Award for Scientists and Engineers (PECASE) extension to ONR Young Investigator Award. N00014-00-1-0469. Period: 06/01/03-12/31/05. Total Award Amount: \$200,004.
- Completed:** “Scientific Computing Research Environments for the Mathematical Sciences(SCREMS),” (jointly with E. G. Puckett, E. Rains, J. De Loera, and Angela Cheer), NSF, Award No. DMS-0532308. Period: 09/15/05–12/31/06. Total Award Amount: \$125,007.
- Completed:** “Training Program in Vision Science,” (PI: J. S. Werner; I am one of the 20 preceptors), NIH, Award No. 5 T32 EY015387. Period: 09/30/03–08/31/08. Total Award Amount: \$ 1,088,712.
- Completed:** “Object-Oriented Image Analysis and Synthesis using Computational Harmonic Analysis and Boundary Value Problems”, NSF, Award No. DMS-0410406. Period: 08/01/04–07/31/08. Total Award Amount: \$282,492.
- Completed:** “Analysis and Classification of High-Dimensional Patterns using Fast, Flexible, Adaptable, and Hierarchical Feature Extractors”, ONR, Award No. N00014-06-1-0615–N00014-07-1-0166. Period: 05/01/06–09/30/09. Total Award Amount: \$326,489.
- Completed:** “A Tight Integration of Wavefield Simulation and Object Classification by Modern Computational Harmonic Analysis Techniques,” (co-PI: J. Bremer, Jr.), ONR, Award No. N00014-09-1-0318. Period: 01/01/09–12/31/11. Total Award Amount: \$449,262.51.
- Current:** “Training Program in Vision Science,” (PI: J. S. Werner; I am one of the 22 preceptors), National Eye Institute (NEI) of the NIH, Award No. 5 T32 EY015387. Period: 09/01/08–08/31/13. Total Award Amount: \$ 759,607.

**Current:** “Enhancements and Improvements on the Local Discriminant Basis Algorithms for Sonar Waveform Classification,” ONR, Award No. N00014-09-1-0041. Period: 10/01/08–09/30/12. Total Award Amount: \$224,999.

**Current:** “Vision Research Core Grant,” (PI: J. S. Werner; I am one of the participating investigators), NEI/NIH, Award No. P30 EY012576 Period: 07/01/04–06/30/14. Total amount: \$3,686,119.

**Current:** “Modern Computational Harmonic Analysis for Data Analysis, Modeling, and Simulation,” (co-PI: J. Bremer, Jr.), ONR, Award No. N00014-12-1-0117. Period: 01/01/12–09/30/14. Total Award Amount: \$450,000.

**Current:** “Statistics in the 21st Century - Objects, Geometry and Computing,” (PI: W. Polonik; I am serving as Senior Personnel), NSF, Award No. DMS-1148643. Period: 05/01/12?–04/30/17. Total Award Amount: \$2,000,000.

### Patents

**N. Saito**, N. N. Bennett, and R. Burrige, “Methods of Determining Dips and Azimuths of Fractures from Borehole Images,” US Patent Number 5,960,371, Grant Date: 9/28/99.

T. S. Ramakrishnan, R. Ramamoorthy, **N. Saito**, and C. Flaum, “Method for Interpreting Carbonate Reservoirs,” US Patent Number 6,088,656, Grant Date: 7/11/00, also UK Patent Number GB2346230, Grant Date: 12/19/00.

**N. Saito**, A. Rabaute, and T. S. Ramakrishnan, “Method for Interpreting Petrophysical Data,” UK Patent Number GB2345776, Grant Date: 1/16/01.

K. Yamatani and **N. Saito**, “Data Compression/Decompression, Program, and Device,” Japan Patent Number 4352110, Grant Date: 8/7/09. US Patent Number 8,059,903, Grant Date: 11/15/11.

### Professional Expertise

**Technical problem solving:** Identifying and defining scientific problems, analyzing and interpreting data by integrating mathematical theory and computer experiments, and presenting results in an intuitive manner.

**Interdisciplinary and collaborative strategy for research:** Working with scientists and researchers in different disciplines (e.g., biology, medicine, geology, geophysics, defense industries, etc.), creating new ideas from different view points, and forming common threads among my collaborators.

**Research interests and expertise:** Applied and computational harmonic analysis; data compression; statistical signal/image processing and analysis; feature extraction, pattern recognition, classification, and regression; elliptic PDEs, eigenvalue problems, boundary value problems, potential theory; geophysical inverse problems; human and machine perception (auditory and visual systems); computational neuroscience.

**Computer skills:** Mathematical/scientific software development in C++, C, and Fortran; object oriented programming; high level programming languages (MATLAB, R, and S-PLUS); Unix environment; scientific word processing systems ( $\text{\LaTeX}$ ,  $\text{\LaTeX} 2_{\epsilon}$ ,  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\text{\LaTeX}$ ).

**Experiences and Service Activities****Department of Mathematics, University of California, Davis, CA**

Organizer–Joint Mathematics/Statistics Colloquium (2009–present)  
Member–Statistics Faculty Search Committee (2009–2010)  
Member–Advisory Committee for the NEI Vision Science Training Grant (2008–present)  
Chair–Graduate Group in Applied Mathematics (2007–present)  
Member–Departmental Awards Committee (2007–2008)  
Proposal Reviewer–Academic Federation Research Grant Program: Innovative Developmental Awards (2007)  
Chair–Faculty Representative Committee (2006–2007)  
Chair–Universe@UCDavis Initiative Search Committee (2006–2007)  
Member–Steering Committee of Universe@UCDavis Initiative (2006–present)  
Representative on Scientific Computing Graduate Courses (2005–present)  
Member–Undergraduate Program Committee’s Subcommittee on MAT 129 (2005)  
Chair–Ad hoc Committee on tenure promotion (2004)  
Representative–CSE Retreat (2003, 2007)  
Member–CSE Faculty Search Committee (2002–2003)  
Internship coordinator–NSF VIGRE grant (2002–2007)  
Member–GGAM Brochure Committee (2002)  
Peer Reviewer–Teaching evaluation for promotion cases(2001, 2002, 2009, 2011)  
Organizer–Applied & Computational Harmonic Analysis Reading Seminar (2001–2007)  
Member–NSF VIGRE Research Focus Group on Applied Computational Harmonic Analysis (2002–2004)  
Organizer–Applied Mathematics Seminar (2001–2002)  
Member–Math Department Library Representative (2001–2002)  
Member–Executive Committee of the College of Letters and Science (2001–2004)  
Member–Business Manager Search Committee (2001)  
Chair–Regular Faculty Search Committee (2000–2001)  
Member–Executive Committee, Graduate Group in Statistics (2000–2004)  
Member–Executive Committee, Graduate Group in Applied Mathematics (2000–2002, 2006–2007)  
Proposal Reviewer–Gertrude Carter Cancer Research Program (2000)  
Member–Advisory board of GAANN grant (2000–present)  
Member–Ad hoc committee on tenure promotion (1999, 2000)  
Member–Undergraduate Program Committee’s Subcommittee on MAT 22AB and MAT 121 (1999)  
Member–Institute of Theoretical Dynamics Advisory Committee (1999–2002)  
Member–Hiring Committee, Department of Geology (1999)  
Graduate Advisors, Graduate Group in Applied Math (1999–present)  
Member–Computer Committee (2000–2002,2003–2004), assisting the department poster project

Chair–Computer Committee (1998–2000) and obtained \$90K internal grant at UCD for Instructional Use of Computers

Member–Faculty Representative Committee (1998–2000, 2002–2004, 2005–2006)

Graduate Advisors, Division of Statistics (1997–2002)

### **Schlumberger-Doll Research, Ridgefield, CT**

Responsible for research on interpretation methodologies of complex and high volume geological and geophysical datasets for oil and gas reserve estimation.

Conducted research on wavelets and their applications to time-frequency analysis techniques, feature extraction, statistical pattern recognition, classification and regression.

Conducted research on seismic deconvolution, tomography, modeling and inversion.

Conducted research on image processing and analysis including image enhancement, noise removal, data compression, edge detection.

Transformed the research results to software packages and transferred them to the company’s engineering centers.

Conducted research on object-oriented programming and scientific programming environment.

Wrote patent memoranda (filed to the US patent office).

Wrote over 20 company reports including five confidential ones.

### **Department of Mathematics, Yale University, New Haven, CT**

Conducted basic research as *Assistance in Research* (1991–94, full and part time) on wavelets and other local basis functions and their applications to statistics and signal processing.

### **Nippon Schlumberger K.K., Fuchinobe, Japan**

Developed seismic interpretation software for reservoir modeling systems using the local Radon transform.

Commercialized the above software and developed its graphical user-interface.

Supervised a junior engineer for 1.5 years.

### **Toshiba Research Laboratory, Kawasaki, Japan**

Compared the performance of compilers including Fortran, APL, PL1, and Lisp, as a *summer intern* (1980).

## **Teaching Experience**

### **University of California, Davis, CA**

Designed and taught the graduate topics course MAT 280 “Harmonic Analysis on Graphs and Networks” (2012).

Taught MAT 129 “Fourier Analysis” (2006, 2010).

Taught MAT 271 “Applied and Computational Harmonic Analysis” (2006, 2010).

Taught MAT 21C “Calculus: Partial Derivatives and Series” (2006, 2008, 2009, 2011).

Revised syllabus of MAT 167 “Applied Linear Algebra” (2007).

Designed and taught the graduate topics course MAT 280 “Laplacian Eigenfunctions: Theory, Applications, and Computations” (2007).

Supervised one undergraduate student for independent research (2006–2007).

Composed syllabus of “Fourier Analysis” and helped turning this into a regular undergraduate course MAT 129 (2006).

Taught MAT 167 “Applied Linear Algebra” (2006, 2012).

Taught MAT 167 “Advanced Linear Algebra” (2004).

Composed syllabus of “Applied and Computational Harmonic Analysis” and helped turning this into a regular graduate course MAT 271 (2004).

Designed and taught the graduate course on MAT 280 “Computational Harmonic Analysis” (1999, 2002, 2004).

Revised syllabus of MAT 167 “Advanced Linear Algebra” (2003).

Reviewed syllabus of MAT 121 “Advanced Analysis for the Sciences” (2003).

Taught MAT 121 “Advanced Analysis for the Sciences” (2002).

Taught MAT 167 “Linear Algebra and Applications” (1999, 2002).

Taught and developed the material of the course MAT 229AB “Numerical Methods in Linear Algebra” including applications ranging from image processing to geophysical inverse problems (1997-98, 2000, 2002).

Taught MAT 22B “Differential Equations” (1998, 1999, 2001).

Taught MAT 132A “Introduction to Stochastic Processes” (2001).

Designed and taught the undergraduate course on MAT 180 “Fourier Analysis and Its Applications” (2000).

Taught MAT 128C “Numerical Analysis in Differential Equations” (2000).

Supervised 14 interns from Ecole Polytechnique, Paris (1996–present).

Supervised four summer undergraduate interns under REU NSF/VIGRE Grant (2002,2003,2005).

### **Schlumberger-Doll Research, Ridgefield, CT**

Supervised five summer interns (M.S., Ph.D. students) for signal and image processing projects (1990–96).

### **Motoyawata Learning School, Ichikawa, Japan**

Taught many high school students ranging from 7th to 12th grades as a *Teacher of mathematics* (1977–84, part time).

### **Consulting Experience**

Consultation on computational harmonic analysis and their applications in different industries including Schlumberger, Lockheed Martin Corp., Raytheon, Fast Mathematical Algorithms and Hardware Corp., Plain Sight Systems, Inc., Code Fount, Inc., and TriCircle Company.

### **List of postdoctoral and graduate students supervised**

Former postdoctoral researcher: Jean-Marie Aubry (now at Université Paris XII–Val de Marne), Xiaoping Shen (now at Ohio University), Katsu Yamatani (now at Meijo University, Japan), Linh Lieu, Zhihua Zhang (now at Beijing Normal University, China).

Former postgraduate researcher: Jean-François Remy (now at VirtuOz).

Current postdoctoral researcher: Ian Sammis.

Current Ph.D. students: Ernest Woei (GGAM).

Former Ph.D. students: Lin Jen-Jen Chang (Stat; now at Ming Chuan Univ., Taiwan), Brons Larson (GGAM; now at SAIC, San Diego), Noel Smith (Math; now at Center for Neuroscience, UC Davis), Xiaodong Xue (GGAM; now at Amgen, Inc.), Jucheng Zhao (GGAM; now at US Bancorp), Zhihua Zhang (GGAM; now at Beijing Normal Univ.), Bradley Marchand (GGAM; now at Naval Surface Warfare Center, Panama City, FL).

Ph.D. Oral Exam Committee: Toyoki Matsuzawa (MAE), Craig Johns (Stat), Todd Gable (Applied Science/Lawrence Livermore), Lin Jen-Jen Chang (Stat), Francisco Rueda (Civil Eng.), Youn-Sha Chan (GGAM), Phil Gullett (Civil Eng.), Brons Larson (GGAM), Stefano Berton (Civil Eng.), Xiajian Nie (Civil Eng.), Scott Beaver (GGAM), Phil Sallee (CS), Ruriko Yoshida (Math), Noel Smith (Math), Thomas Drumright (ECE), Michael Last (Stat), Jucheng Zhao (GGAM), Xiaodong Xue (GGAM), Raymond Guan (GGAM), Sarah Williams (GGAM), Ritesh Sood (ECE), Zhihua Zhang (GGAM), Michael Schneider (Physics), Jeremy Roberson (ECE), Nattapol Sitthimahachakul (ECE), Dong Chen (Stat), Bradley Marchand (GGAM), Brandon Bozek (Physics), Matt Herman (GGAM), David Lagattuta (Physics), Li Zhang (ECE), Ernest Woei (GGAM), Huy-Dung Han (ECE), Randy Lai (Stat), Andreas Rueetschi (ECE), Khadar Shaik (ECE), Tim Wertz (Math).

Ph.D. Oral Exam Committee Chair: Denis Grishin (GGAM), Wei Yu (GGAM), Jiadong Xu (GGAM), Pengchong Yan (GGAM), Yuji Nakatsukasa (GGAM), Arcade Tseng (GGAM), Mihaela Ifrim (Math), Tom Hunt (GGAM), Lawrence Austria (Math), Joohee Hong (GGAM), Wenjing Liao (GGAM).

Ph.D. Dissertation Committee: Lin Jen-Jen Chang (Stat, 2000), Brons Larson (GGAM, 2002), Scott Beaver (GGAM, 2004), Denis Grishin (GGAM, 2004), Phil Sallee (CS, 2004), Ruriko Yoshida (Math, 2004), Stephane Lafon (Yale, 2004), Michael Last (Stat, 2005), Yoel Shkolnisky (Tel-Aviv, 2005), Arthur Szlam (Yale, 2006), Noel Smith (Math, 2006), Jucheng Zhao (GGAM, 2006), Wei Yu (GGAM-Stat, 2006), Jiadong Xu (GGAM, 2006), James Bremer (Yale, 2007), Xiaodong Xue (GGAM, 2007), Zhihua Zhang (GGAM, 2007), Raymond Guan (GGAM, 2008), Pengchong Yan (GGAM, 2008), Ritesh Sood (ECE, 2009), Matthew Herman (GGAM, 2009), Bradley Marchand (GGAM, 2010), Blake Hunter (GGAM, 2011), Tom Hunt (GGAM, 2011), Yuji Nakatsukasa (GGAM, 2011), Arcade Tseng (GGAM, 2011).

Current: Ernest Woei (GGAM), Wenjing Liao (GGAM).

MS Thesis Committee: Sean Mullen (GGAM, 2002), Jeffrey Housman (GGAM, 2004), Peng Li (GGAM, 2004), Sarah Williams (GGAM, 2004), Ernest Woei (GGAM, 2007)

Interns from Ecole Polytechnique: Matthieu Philip (1996), Mohamed Elyes Ben Rayana (1998), Kilani Ben Romdhane (1998), Loïc Amans (1999), Mehdi Charfi (1999), Bertrand Bénichou (2000), Vincent Dandieu (2000), Olivier LeBorne (2001), Jean-François Remy (2001), Laurent Leconte (2002), Franck Nicolas (2002), David Nicault (2003), Jimena Royo Letilier (2008), Julien van Hout (2010), Adrien Hoarau (2011).

### Service to Profession

Serving as a Vice Chair for the SIAM Activity Group on Imaging Science since Jan. 2012.

Organized the minisymposium “Harmonic Analysis on Graphs and Networks: Theory and Applications” at International Congress on Industrial and Applied Mathematics (ICIAM), Vancouver, Canada, July 2011.

Invited to the National Academies Keck Futures Initiative (NAKFI) conference: “Seeing the Future with Imaging Science,” Irvine, CA, 11/17/10–11/19/10.

Served as an organizer for the IPAM Reunion Conference on “Mathematics of Knowledge and Search Engines,” Lake Arrowhead, 06/06/10–06/11/10.

- Served as a proposal reviewer for the Israel Science Foundation (2010).
- Served as an extramural reviewer of a full professor appointment case at Duke University (2010).
- Served as a chair of the organizing committee of the AMS Special Session on “The Mathematics of Information and Knowledge,” at Joint Mathematics Meetings, San Francisco, 01/14/10–01/15/10.
- Served as a member of the nominating committee for the SIAM Activity Group on Imaging Science (2009)
- Served as an extramural reviewer of a full professor promotion case at UC Berkeley (2009).
- Served as an extramural reviewer of a tenure promotion case at Auburn University at Montgomery, AL (2009).
- Served as a co-organizer of the special session “Kernel Methods in Data Analysis,” at IEEE Workshop on Statistical Signal Processing, Cardiff, Wales, UK, Sep. 2009.
- Member of the Editorial Board of *Inverse Problems and Imaging* (2008-present).
- Served as a proposal reviewer for the US-Israel Binational Science Foundation (2009, 2011).
- Served as a co-organizer of the short program “Laplacian Eigenvalues and Eigenfunctions: Theory, Computation, Application,” at Institute for Pure & Applied Mathematics, UCLA, 02/09/09–02/13/09.
- Served as a co-organizer of the minisymposium “Laplacian Eigenfunctions and Applications in Image Science,” 4th SIAM Imaging Science Conf., San Diego, CA, Jul. 2008.
- Served as an NSF Review Panelist, Feb. 2008.
- Member of the Editorial Advisory Board of *Applied and Computational Harmonic Analysis* (2007-present).
- Program Committee, SPIE Conference on Wavelets XII, Aug. 2007.
- Organized the minisymposium “Laplacian Eigenfunctions and Their Applications” at International Congress on Industrial and Applied Mathematics (ICIAM), Zürich, Switzerland, July 2007.
- Served as an extramural reviewer of a tenure promotion case at Ohio University (2007).
- Served as an extramural reviewer of a tenure promotion case at Georgia Institute of Technology (2007).
- Served as an NSF Review Panelist, Sep. 2005.
- Program Committee, SPIE Conference on Wavelets XI, Aug. 2005.
- Served as a reviewer of NSF proposals (one proposal for 2000-2001, three proposals for 1999-2000, one proposal for 2002-2003, two proposals for 2003-2004, three proposals for 2004-2005, 11 proposals for 2005 as a panelist, 7 proposals for 2008 as a panelist).
- Served as a reviewer of NSERC (Canadian NSF) proposal (2005).
- Served as an extramural reviewer of a tenure promotion case at Georgia Institute of Technology (2005).
- Served as an extramural reviewer of a tenure promotion case at Univ. of California, Riverside (2005).
- Served as an organizer of the special long-term program “Multiscale Geometry and Analysis in High Dimensions” at Institute for Pure & Applied Mathematics, UCLA, 09/07/04–12/17/04.
- Chair, Organizing Committee, Workshop on “Multiscale Structures in the Analysis of High-Dimensional Data,” Oct. 2004, IPAM. This is the highest rated (by the participants) workshop in the history of IPAM so far.

Member, Organizing Committee, Workshop on “Multiscale Geometry in Image Processing and Coding,” Sep. 2004, IPAM.

Member, Organizing Committee, Mini-Workshop on “Bandlimited Functions, PSWFs, and High Order Methods,” Nov. 2004, IPAM.

Tutorial Speaker at IPAM Program, Sep. 2004.

Served as an extramural reviewer of a tenure promotion case at Univ. of Colorado at Boulder (2004).

Participated in the invitation-only symposium “Frontiers of Science,” organized by the National Academy of Sciences, Nov. 2003.

Session Chairperson at Wavelets and Statistics Conference, Sep. 2003.

Session Chairperson at SPIE Conference on Wavelets X, Aug. 2003.

Program Committee, SPIE Conference on Wavelets X, Aug. 2003.

Participated in the invitation-only workshop on “Approaches to Combat Terrorism: Opportunities for Basic Research,” co-organized by NSF and US Intelligence Community, Nov. 2002.

Served as an extramural reviewer of a tenure promotion case at Boston Univ. (2002).

Session Chairperson at SPIE Conference on Wavelets IX, Jul. 2001.

Program Committee, SPIE Conference on Wavelets IX, Jul. 2001.

Session Chairperson at 2nd International Symposium on Frontiers of Time Series Modeling: Nonparametric Approach to Knowledge Discovery, Nara, Japan, Dec. 2000.

Session Chairperson at SPIE Conference on Wavelet Applications in Signal and Image Processing VIII, Jul. 2000.

Program Committee, SPIE Conference on Wavelet Applications in Signal and Image Processing VIII, Jul. 2000.

Session Chairperson at SPIE Conference on Wavelet Applications in Signal and Image Processing VII, Jul. 1999.

Session Chairperson at SPIE Conference on Wavelet Applications in Signal and Image Processing VI, Jul. 1998.

Program Committee, SPIE Conference on Wavelet Applications in Signal and Image Processing VI, Jul. 1998.

Served as a reference for several academic and industrial job seekers (1998-present).

Session Chairperson on “Advances in Wavelet Transform Applications in Geophysics III,” American Geophysical Union 1997 Fall Meeting, San Francisco, Dec. 1997.

Served frequently as a referee to many scientific journals including:

Annals of the Institute of Statistical Mathematics

Applied and Computational Harmonic Analysis

Computational Statistics and Data Analysis

EURASIP Journal on Advances in Signal Processing

Geophysics

Geophysical Research Letters  
IEEE Signal Processing Letters  
IEEE Trans. on Image Processing  
IEEE Trans. on Information Theory  
IEEE Trans. on Medical Imaging  
IEEE Trans. on Signal Processing  
IEEE Trans. on Speech and Audio Processing  
IEEE Trans. on Pattern Analysis and Machine Intelligence  
Japanese Journal of Applied Statistics  
Journal of Approximation Theory  
Journal of Computational and Graphical Statistics  
Journal of Computational Neuroscience  
Journal of Computer Methods in Applied Mechanics and Engineering  
Journal of Fourier Analysis and Applications  
Journal of Geophysical Research  
Journal of Machine Learning Research  
Journal of Mathematical Imaging and Vision  
Journal of the Royal Statistical Society, Series B  
Linear Algebra and Its Applications  
Optical Engineering  
Pattern Recognition  
Proceedings of the National Academy of Sciences  
Proceedings of the Royal Society of London, Series A  
SIAM Journal on Numerical Analysis  
Signal Processing

**Service to the Community**

Served as Treasurer of Port of Sacramento Japanese School, Oct. 2000–Sep. 2001.

**Memberships**

Institute of Electrical and Electronics Engineers (IEEE)  
Institute of Mathematical Statistics (IMS)  
Society for Industrial and Applied Mathematics (SIAM)  
Japan Society for Industrial and Applied Mathematics (JSIAM)

**Visiting Positions**

Institute for Pure and Applied Mathematics (IPAM), UCLA, Sep.–Dec. 2007.

Mathematical Science Research Institute (MSRI), Berkeley, Jan.–May 2005.

Institute for Pure and Applied Mathematics (IPAM), UCLA, Sep.–Dec. 2004.

Department of Mathematics, KTH (Royal Institute of Technology), Stockholm, Sweden, Sep.–Oct. 1998.

Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, Aug. 1998.

**Conferences and Meetings**

Over 140 presentations at national and international conferences, workshops, and seminars including International Congress of Industrial and Applied Mathematicians, Joint Mathematics Meetings, Joint Statistical Meetings, IEEE International Conference on Acoustics, Speech, and Signal Processing, SIAM Annual Meeting, SIAM Conference on Imaging Science.

**Invited Lectures**

Plenary talk, Wavelets Session, Spring Meeting of Japan Society for Industrial and Applied Mathematics, Hakata, Japan, Mar. 2012.

Special Seminar, National Institute for Basic Biology, Okazaki, Japan, Mar. 2012.

Imaging Science Symposium and Bioimaging Forum, National Institute for Basic Biology, Okazaki, Japan, Mar. 2012

Workshop on “Large Scale Multimedia Search,” IPAM, UCLA, Jan. 2012.

Colloquium, Department of Applied Mathematics, Univ. Waterloo, Canada, Oct. 2011.

Colloquium, Department of Mathematics, Univ. Arizona, May 2011.

Workshop on “Sampling and Reconstruction: Applications and Advances,” Banff International Research Station (BIRS), Canada, Dec. 2010.

Workshop on “Recent development and scientific applications in wavelet analysis,” Research Institute for Mathematical Sciences (RIMS), Kyoto, Japan, Oct. 2010.

Wavelets Session, Annual Meeting of Japan Society for Industrial and Applied Mathematics, Tokyo, Japan, Sep. 2010.

Symposium on Geometry Processing 2010, Lyon, France, Jul. 2010.

IPAM-Mathematics of Knowledge and Search Engines Reunion Conference II, Lake Arrowhead, CA, Jun. 2010.

Minisymposium on “Local Scales: Theory and Applications,” 5th SIAM Imaging Science Conf., Chicago, IL, Apr. 2010.

Minisymposium on “Surveillance and Security Imaging,” 5th SIAM Imaging Science Conf., Chicago, IL, Apr. 2010.

Minisymposium on “Diffusion Geometry/Approximation on Manifolds,” 13th Approximation Theory Conference, San Antonio, TX, Mar. 2010.

- SIAM Minisymposium on New Trends in Mathematical Methods in Imaging Science, Joint Mathematics Meetings, San Francisco, CA, Jan. 2010.
- Colloquium, Department of Statistics, UC Davis, Nov. 2009.
- 15th IEEE Workshop on Statistical Signal Processing, Cardiff, Wales, UK, Sep. 2009.
- Oberwolfach Workshop on “Challenges in Statistical Theory: Complex Data Structures and Algorithmic Optimization,” Aug. 2009.
- Special lecture, Department of Mathematical Engineering and Information Physics, University of Tokyo, Jul. 2009.
- Plenary talk, 20 Years of Wavelets, DePaul Univ., Chicago, May 2009.
- Applied Mathematics Seminar, Department of Mathematics, Stanford Univ., May 2009.
- Invited Seminar, Japan Geoscience Institute (JGI), Inc., Tokyo, Japan, Mar. 2009.
- Plenary talk, Wavelets Session, Spring Meeting of Japan Society for Industrial and Applied Mathematics, Kyoto, Japan, Mar. 2009.
- Workshop on “Laplacian Eigenvalues and Eigenfunctions: Theory, Computation, Application,” IPAM, UCLA, Feb. 2009.
- Minisymposium on “Laplacian Eigenfunctions and Applications in Image Science,” 4th SIAM Imaging Science Conf., San Diego, CA, Jul. 2008.
- Minisymposium on “Recent Developments in Underwater Imaging,” 4th SIAM Imaging Science Conf., San Diego, CA, Jul. 2008.
- TUS International Collaboration Workshop, Tokyo University of Science, Japan, Mar. 2008.
- Plenary talk, Wavelets Session, Spring Meeting of Japan Society for Industrial and Applied Mathematics, Tokyo, Japan, Mar. 2008.
- Colloquium, Department of Mathematics, Auburn University at Montgomery, AL, Feb. 2008.
- IPAM-Mathematics of Knowledge and Search Engines Culminating Conference, Lake Arrowhead, CA, Dec. 2007.
- Minisymposium on “Laplacian Eigenfunctions and Their Applications” at International Congress on Industrial and Applied Mathematics (ICIAM), Zürich, Switzerland, Jul. 2007.
- IPAM-Multiscale Geometry and Analysis Reunion Conference II, Lake Arrowhead, CA, Jun. 2007.
- Workshop on “Image Processing for Random Shapes: Applications to Brain Mapping, Geophysics and Astrophysics,” IPAM, UCLA, May 2007.
- Workshop on Mathematics of Visual Analysis, MSRI, Berkeley, Oct. 2006.
- Applied & Computational Math Seminar, Georgia Tech, Sep. 2006.
- Seminar, Naval Surface Warfare Center, Panama City, FL, Sep. 2006.
- Seminar, Schlumberger-Doll Research, Ridgefield, CT, Sep. 2006.
- Applied Math Seminar, Yale Univ., Sep. 2006.
- IPAM-Multiscale Geometry and Analysis Reunion Conference, Lake Arrowhead, CA, Jun. 2006.

- Minisymposium on “Recent Developments in Total Variation Based Models,” 3rd SIAM Imaging Science Conf., Minneapolis, MN, May 2006.
- Applied Math Colloquium, UCLA, Mar. 2006.
- International Workshop on Ecological Informatics for Chaotic and Complex Systems, Tokyo University of Agriculture and Technology, Fuchu, Japan, Mar. 2006.
- Seminar, Schlumberger K. K., Fuchinobe, Japan, Feb. 2006.
- Annual Meeting of Japan Society for Industrial and Applied Mathematics, Sendai, Japan, Sep. 2005.
- Colloquium, Dept. of Systems Engineering, Shizuoka Univ., Hamamatsu, Japan, Sep. 2005.
- Seminar, Schlumberger-Ribaud Product Center, Clamart, France, Jul. 2005.
- Sparse Representations in Redundant Systems Workshop, Center for Scientific Computation and Mathematical Modeling, Univ. Maryland, College Park, May 2005.
- Colloquium, Department of Statistics, UC Davis, Oct. 2004.
- Multiscale Geometry in Image Processing and Coding Workshop, Institute for Pure and Applied Mathematics, UCLA, Sep. 2004.
- Computational Harmonic Analysis and Image Analysis Workshop, Tokyo Metropolitan University, Jul. 2004.
- Keynote speaker, 2nd International Conference on Computational Harmonic Analysis, Vanderbilt Univ., May 2004.
- Applied Math Seminar, Yale Univ., Mar. 2004.
- 37th Asilomar Conference on Signals, Systems, and Computers, Nov. 2003.
- “Wavelets and Statistics” conference, Grenoble, France, Sep. 2003.
- Seminar, Université de Paris XII, Creteil, France, Sep. 2003.
- ONR Image Processing Thrust Workshop, Univ. Minnesota, May 2003.
- Seminar, Schlumberger K. K., Fuchinobe, Japan, Jan. 2003.
- Colloquium, Tokyo University of Agriculture and Technology, Jan. 2003.
- Minisymposium on “Wavelets and Image Processing,” 1st SIAM Conference on Imaging Science, Boston, Mar. 2002.
- Colloquium, Mathematics and Computer Science Department, Univ. Nevada, Reno, Dec. 2001.
- Colloquium, Mathematics and Statistics Department, CSU Sacramento, Nov. 2001.
- Neyman Seminar, Statistics Department, UC Berkeley, Oct. 2001.
- Joint Statistical Meeting, Bayesian Statistics Section, Atlanta, Aug. 2001.
- SIAM Annual Meeting, San Diego, Jul. 2001.
- MSRI Summer Graduate Program “Modern Signal Processing,” Berkeley, CA, Jun. 2001.
- Sacramento Statistical Association Annual Meeting, Sacramento, Apr. 2001.

- 2nd Bay Area Scientific Computing Day, Livermore, CA, Feb. 2001.
- 2nd International Symposium on Frontiers of Time Series Modeling: Nonparametric Approach to Knowledge Discovery, Nara, Japan, Dec. 2000.
- Colloquium, Department of Statistics, UC Davis, Oct. 2000.
- American Mathematical Society Meeting, Special Session on Computational Wavelet Analysis, Toronto, Canada, Sep. 2000.
- ONR Conference on Image Processing: Theory, Analysis and Applications, Los Angeles, IPAM, Sep. 2000.
- SPIE conference on Wavelet Applications in Signal and Image Processing, VIII, San Diego, Aug. 2000.
- Special Lectures, Mathematics Dept., KTH (Royal Institute of Technology), Stockholm, Sweden, Jun. 2000.
- Colloquium, Department of Computer Science, UC Davis, Jun. 2000.
- CBMS lectures/conference on Interactions of Harmonic Analysis, Statistical Estimation, and Data Compression, University of Missouri, St. Louis, MO, May, 2000.
- DARPA PI meeting, Washington DC., Apr. 2000.
- Seminar, Department of Geology, UC Davis, Mar. 2000.
- Seminar, Graduate Group in Applied Math, UC Davis, Feb. 2000.
- Computational Harmonic Analysis Seminar, Dept. of Applied Math., University of Colorado, Boulder, CO, Dec. 1999.
- “Overcomplete Representations and Nonlinear ICA Workshop,” Neural Information Processing Systems, Breckenridge, CO, Dec. 1999.
- Seminar, Raytheon Corp., Tucson, AZ, Sep. 1999.
- SPIE conference on Wavelet Applications in Signal and Image Processing, VII, Denver, Jul. 1999.
- DARPA PI meeting, San Francisco, Jul. 1999.
- Applied Math Seminar, Mathematics Dept., Stanford University, Dec. 1998.
- Colloquium, Mathematics Dept., Sonoma State University, Nov. 1998.
- 32nd Asilomar Conference on Signals, Systems, and Computers, Nov. 1998.
- Mathematical Questions in Signal and Image Processing Programm Seminar, Institut Henri Poincaré, Paris, France, Oct. 1998.
- Seminar, Department of Scientific Computing, Uppsala University, Sweden, Sep. 1998.
- Seminar, Ericsson, Älvsjö, Sweden, Sep. 1998.
- Analysis Seminar, Mathematics Dept., Chalmers University of Technology, Göteborg, Sweden, Sep. 1998.
- Wavelet Seminar, Mathematics Dept., KTH (Royal Institute of Technology), Stockholm, Sweden, Sep. 1998.
- Schlumberger Cambridge Research, Aug. 1998.
- Isaac Newton Institute, Cambridge University, Aug. 1998.
- Seminar, Naval Air Warfare Center, May 1998.

- Seminar, Division of Statistics, UC Davis, Apr. 1998.
- Fourth Biennial Wavelet and Advanced Signal Processing Workshop, dedicated to Louis Auslander, Lockheed-Martin Corp., Orlando, FL., Feb. 1998.
- Graduate Student Seminar, Graduate Group in Applied Mathematics, UC Davis, Jan. 1998.
- Seminar, Institute of Theoretical Dynamics, UC Davis, Jan. 1998.
- Seminar, Mechanical and Aeronautical Engineering, UC Davis, Nov. 1997.
- Wavelets and Statistics Workshop, Duke University, Oct. 1997.
- Seminar, Division of Applied Mathematics, Brown University, Apr. 1997.
- Seminar, Statistics Dept., Rutgers University, Feb. 1997.
- Seminar, Mathematics Dept., North Carolina State University, Feb. 1997.
- Colloquium, Statistics Dept., University of California at Los Angeles, Feb. 1997.
- Seminar, Mathematics Dept., University of California at Davis, Feb. 1997.
- Seminar, Dept. Decision Sciences and Engineering Systems, Rensselaer Polytechnique Institute, Feb. 1997.
- Colloquium, Mathematics Dept., University of Michigan at Ann Arbor, Feb. 1997.
- Applied Mathematics Seminar, Mathematics Dept., University of Michigan at Ann Arbor, Feb. 1997.
- Colloquium, Applied Mathematics Dept., University of Colorado at Boulder, Jan. 1997.
- Statistics Seminar, Mathematics Dept., Imperial College, Jan. 1997.
- Joint Statistical Meeting, Chicago, Aug. 1996.
- Seminar, Mathematics Dept., University of Tokyo, Jul. 1996.
- Seminar, Program in Applied and Computational Mathematics, Princeton University, May 1996.
- Seminar, Statistics Dept., University of Washington, Mar. 1996.
- Colloquium, Mathematics Dept., Dartmouth College, Mar. 1996.
- Colloquium, Statistics Dept., University of Connecticut at Storrs, Dec. 1995.
- Third Biannual Wavelet Workshop: Advanced Topics in Wavelets and Adapted Waveform Analysis, Lockheed Martin Corp., Orlando, FL, Nov. 1995.
- International Congress on Industrial and Applied Mathematics, Hamburg, Germany, Jul. 1995.
- Western Regional Institute of Mathematical Statistics Meeting, Stanford, CA, Jun. 1995.
- Seminar, Mathematics Dept., Royal Institute of Technology (KTH), Stockholm, Sweden, May 1995.
- Seminar, Mathematics Dept., Washington University, St. Louis, MO, May 1995.
- American Mathematical Society Meeting, Chicago, IL, Mar. 1995.
- Seminar, Electrical Engineering Dept., Northwestern University, Mar. 1995.
- Seminar, Mathematics Dept., Yale University, Feb. 1995.
- Seminar, Geophysics Dept., Stanford University, Jul. 1988.

## Publications

### Published Articles

1. 1984 **N. Saito**, “Interaction of traveling waves on parallel active lines,” *Proceedings of the Workshop on Nonlinear Problems*, (in Japanese), NLP84-17, pp. 9-18, the Institute of Electronics and Communication Engineers of Japan, Tokyo, Japan.
2. 1990 **N. Saito**, “Superresolution of noisy band-limited data by data adaptive regularization and its application to seismic trace inversion,” *Proceedings of 1990 International Conference on Acoustics, Speech, and Signal Processing*, vol. 3, pp. 1237-1240.
3. 1990 **N. Saito** and M. A. Cunningham, “Generalized  $E$ -filter and its application to edge detection,” *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 12, pp. 814-817.
4. 1992 **N. Saito** and G. Beylkin, “Multiresolution representations using the auto-correlation functions of compactly supported wavelets,” *Proceedings of 1992 International Conference on Acoustics, Speech, and Signal Processing*, vol. 4, pp. 381-384.
5. 1992 G. Beylkin and **N. Saito**, “Wavelets, their autocorrelation functions, and multiresolution representations of signals,” in *Intelligent Robots and Computer Vision XI: Biological, Neural Net, and 3-D Methods* (D. P. Casasent, ed.), Proceedings of SPIE, vol. 1826, pp. 39-50.
6. 1993 **N. Saito** and G. Beylkin, “Multiresolution representations using the auto-correlation functions of wavelets,” in *Progress in Wavelet Analysis and Applications* (Y. Meyer and S. Roques, eds.), pp. 721-726, Editions Frontieres, B.P.33, 91192 Gif-sur-Yvette Cedex, France.
7. 1993 **N. Saito** and G. Beylkin, “Multiresolution representations using the auto-correlation functions of compactly supported wavelets,” *IEEE Transactions on Signal Processing*, vol. 41, pp. 3584-3590.
8. 1994 **N. Saito**, “Simultaneous noise suppression and signal compression using a library of orthonormal bases and the minimum description length criterion,” in *Wavelet Applications* (H. H. Szu, ed.), Proceedings of SPIE, vol. 2242, pp. 224-235.
9. 1994 R. R. Coifman and **N. Saito**, “Constructions of local orthonormal bases for classification and regression,” *Comptes Rendus de l’Académie des Sciences, Série I*, vol. 319, pp. 191-196.
10. 1994 **N. Saito** and R. R. Coifman, “Local discriminant bases,” in *Wavelet Applications in Signal and Image Processing II* (A. F. Laine and M. A. Unser, eds.), Proceedings of SPIE, vol. 2303, pp. 2-14.
11. 1994 **N. Saito**, “Simultaneous noise suppression and signal compression using a library of orthonormal bases and the minimum description length criterion,” in *Wavelets in Geophysics* (E. Foufoula-Georgiou and P. Kumar, eds.), chap. XI, pp. 299-324, Academic Press, San Diego, CA.
12. 1995 **N. Saito** and R. R. Coifman, “On local orthonormal bases for classification and regression,” *Proceedings of 1995 International Conference on Acoustics, Speech, and Signal Processing*, pp. 1529-1532.
13. 1995 **N. Saito** and R. R. Coifman, “Local discriminant bases and their applications,” *Journal of Mathematical Imaging and Vision*, vol. 5, no. 4, pp. 337-358, Invited paper.
14. 1996 R. R. Coifman and **N. Saito**, “The local Karhunen-Loève Bases,” *Proceedings of IEEE International Symposium on Time-Frequency and Time-Scale Analysis*, pp. 129-132.
15. 1996 **N. Saito** and R. R. Coifman, “On local feature extraction for signal classification,” in *Applied Analysis* (O. Mahrenholtz and R. Mennicken, eds.), *special issue of Zeitschrift für Angewandte Mathematik und Mechanik*, pp. 453-456, Akademie-Verlag, Berlin.

16. 1997 **N. Saito** and R. R. Coifman, "Improved local discriminant bases using empirical probability density estimation," *1996 Proceedings of the Computing Section of the American Statistical Association*, pp. 312–321, Invited paper.
17. 1997 **N. Saito**, "Classification of geophysical acoustic waveforms using time-frequency atoms," *1996 Proceedings of the Computing Section of the American Statistical Association*, pp. 322–327.
18. 1997 **N. Saito** and R. R. Coifman, "Extraction of geological information from acoustic well-logging waveforms using time-frequency wavelets," *Geophysics*, vol. 62, no. 6, pp. 1921–1930.
19. 1998 **N. Saito**, "Least statistically-dependent basis and its applications to image modeling," in *Wavelet Applications in Signal and Image Processing VI* (A. Laine and M. Unser and A. Aldroubi, eds.), Proceedings of SPIE vol. 3458, pp. 24–37.
20. 1998 **N. Saito**, "The least statistically-dependent basis and its applications," in *Proceedings of 32nd Asilomar Conference on Signals, Systems & Computers*, pp. 732–736.
21. 1999 N. N. Bennett, R. Burrige, and **N. Saito**, "A method to detect and characterize ellipses using the Hough transform," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 21, no. 7, pp. 652–657.
22. 1999 **N. Saito**, "The local Fourier dictionary: a natural tool for data analysis," *Wavelet Applications in Signal and Image Processing VII* (M. A. Unser, A. Aldroubi, and A. F. Laine, eds.), Proceedings of SPIE, vol. 3814, pp. 610–624, Invited Paper.
23. 2000 J.-J. Lin, **N. Saito**, and R. A. Levine, "An iterative nonlinear Gaussianization algorithm for resampling dependent components," *Proceedings of 2nd International Workshop on Independent Component Analysis and Blind Signal Separation*, pp. 245–250.
24. 2000 **N. Saito**, "Local Feature Extraction and Its Applications Using a Library of Bases," *Selected PhD Thesis in Analysis and Applications* (R. R. Coifman, ed.), World Scientific Publishing Co., Inc.
25. 2000 **N. Saito**, B. Larson, and B. Bénichou, "Sparsity and statistical independence from a best-basis viewpoint," *Wavelet Applications in Signal and Image Processing VIII* (A. Aldroubi, A. F. Laine, and M. A. Unser eds.), Proceedings of SPIE, vol. 4119, pp. 474–486, Invited paper.
26. 2000 J.-M. Aubry and **N. Saito**, "Wavelet despiking of fractographs," *Wavelet Applications in Signal and Image Processing VIII* (A. Aldroubi, A. F. Laine, and M. A. Unser eds.), Proceedings of SPIE, vol. 4119, pp. 853–860.
27. 2000 **N. Saito**, B. Bénichou, and B. Larson, "Sparsity vs. statistical independence in adaptive signal representations," *Proceedings of the 2nd International Symposium on Frontiers of Time Series Modeling: Nonparametric Approach to Knowledge Discovery*, ISM Report on Research and Education, No. 8, The Institute of Statistical Mathematics, pp. 53–63, Invited paper.
28. 2001 **N. Saito**, "Image approximation and modeling via least statistically-dependent bases," *Pattern Recognition*, vol. 34, pp. 1765–1784.
29. 2001 B. M. Larson and **N. Saito**, "The continuous boundary local Fourier transform," *Wavelets: Applications in Signal and Image Processing IX* (A. F. Laine, and M. A. Unser, A. Aldroubi eds.), Proceedings of SPIE, vol. 4478, pp. 415–426.
30. 2001 T. S. Ramakrishnan, R. Ramamoorthy, E. Fordham, L. Schwartz, M. Herron, **N. Saito**, and A. Rabaute, "A model-based interpretation methodology for evaluating carbonate reservoirs," *2001 Annual Technical Conference of the Society of Petroleum Engineers*, Paper #71704-MS.
31. 2001 **N. Saito** and B. Bénichou, "The spike process: a simple test case for independent or sparse component analysis," *Proc. 3rd International Conference on Independent Component Analysis and Signal Separation* (T.-W. Lee, T.-P. Jung, S. Makeig, and T. J. Sejnowski, eds.), pp. 698–703.

32. 2002 **N. Saito**, R. R. Coifman, F. B. Geshwind, and F. Warner, “Discriminant feature extraction using empirical probability density estimation and a local basis library,” *Pattern Recognition*, vol. 35, pp. 2841–2852.
33. 2003 B. Bénichou and **N. Saito**, “Sparsity vs. statistical independence in adaptive signal representations: A case study of the spike process,” in *Beyond Wavelets* (G. V. Welland ed.), chap. 9, pp. 225–257, Academic Press.
34. 2003 **N. Saito** and J.-F. Remy, “A new local sine transform without overlaps: A combination of computational harmonic analysis and PDE,” in *Wavelets: Applications in Signal and Image Processing X* (M. A. Unser, A. Aldroubi, and A. F. Laine, eds.), Proceedings of SPIE, vol. 5207, pp. 495–506.
35. 2004 **N. Saito**, “The generalized spike process, sparsity, and statistical independence,” in *Modern Signal Processing* (D. Rockmore and D. Healy, Jr. eds.), MSRI Publications, Cambridge University Press, pp. 317–340.
36. 2005 N. N. Bennett and **N. Saito**, “Using edge information in time-frequency representations for chirp parameter estimation,” *Applied and Computational Harmonic Analysis*, vol. 18, no. 2, pp. 186–197.
37. 2005 **N. Saito**, “Geometric harmonics as a statistical image processing tool for images defined on irregularly-shaped domains,” *Proceedings of 13th IEEE Workshop on Statistical Signal Processing*, pp. 425–430.
38. 2005 **N. Saito** and E. Woei, “Simultaneous segmentation, compression, and denoising of signals using polyharmonic local sine transform and minimum description length criterion,” *Proceedings of 13th IEEE Workshop on Statistical Signal Processing*, pp. 315–320.
39. 2005 J. Zhao, **N. Saito**, and K. Yamatani, “PHLFT5: A practical and improved version of polyharmonic local Fourier transform,” in *Wavelets XI* (M. Papadakis, A. F. Laine, and M. A. Unser, eds.), Proceedings of SPIE, vol. 5914, Paper #59141N.
40. 2005 N. T. Smith and **N. Saito**, “The  $n$ -dimensional polyharmonic local sine transform on rectangular domains,” in *Wavelets XI* (M. Papadakis, A. F. Laine, and M. A. Unser, eds.), Proceedings of SPIE, vol. 5914, Paper #591425.
41. 2006 **N. Saito** and J.-F. Remy, “The polyharmonic local sine transform: A new tool for local image analysis and synthesis without edge effect,” *Applied and Computational Harmonic Analysis*, vol. 20, no. 1, pp. 41–73.
42. 2006 K. Yamatani and **N. Saito**, “Improvement of DCT-based compression algorithms using Poisson’s equation,” *IEEE Transactions on Image Processing*, vol. 15, no. 12, pp. 3672–3689.
43. 2007 B. Marchand, **N. Saito**, and H. Xiao, “Classification of objects in synthetic aperture sonar images,” *Proceedings of 14th IEEE Workshop on Statistical Signal Processing*, pp. 433–437.
44. 2007 K. Ashizawa, K. Yamatani, and **N. Saito**, “The method of hierarchical multi-neighbor predictors and residual orthogonal transforms and its application to image compression,” (in Japanese) *Transactions of Japan Society for Industrial and Applied Mathematics*, vol. 17, no. 3, pp. 239–257.
45. 2007 L. Lieu and **N. Saito**, “Automated discrimination of shapes in high dimensions,” in *Wavelets XII* (D. Van De Ville, V. K. Goyal, and M. Papadakis, eds.), Proceedings of SPIE, vol. 6701, Paper #67011V.
46. 2007 Z. Zhang and **N. Saito**, “High-dimensional data compression via PHLCT,” in *Wavelets XII* (D. Van De Ville, V. K. Goyal, and M. Papadakis, eds.), Proceedings of SPIE, vol. 6701, Paper #670127.
47. 2008 J. Zhao, **N. Saito**, and Y. Wang, “PHLST5: A practical and improved version of polyharmonic local sine transform,” *Journal of Mathematical Imaging and Vision*, vol. 30, no. 1, pp. 23–41.

48. 2008 **N. Saito**, “Data analysis and representation on a general domain using eigenfunctions of Laplacian,” *Applied and Computational Harmonic Analysis*, vol. 25, no. 1, pp. 68–97.
49. 2008 Z. Zhang and **N. Saito**, “An approximation formula in Hilbert space,” in *Recent Advances in Computational Sciences* (P. Jorgensen, X. Shen, C.-W. Shu, and N. Yan, eds.), World Scientific Publishing Co., Inc, pp. 218–227.
50. 2009 **N. Saito** and E. Woei, “Analysis of neuronal dendrite patterns using eigenvalues of graph Laplacians,” *Japan SIAM Letters*, vol. 1, pp. 13–16, Invited Paper.
51. 2009 Z. Zhang and **N. Saito**, “Construction of periodic wavelet frames using extension principles,” *Applied and Computational Harmonic Analysis*, vol. 27, no. 1, pp. 12–23.
52. 2009 L. Lieu and **N. Saito**, “Signal classification by matching node connectivities,” *Proceedings of 15th IEEE Workshop on Statistical Signal Processing*, pp. 81–84.
53. 2009 K. Ashizawa, J. Ogawa, K. Yamatani, and **N. Saito**, “A method of sequentially predicting DCT coefficients using gradient information of an input signal and its application to image compression,” (in Japanese) *Urban Science Studies*, vol. 14, no. 3, pp. 63–70.
54. 2010 **N. Saito** and Z. Zhang, “On an efficient sparse representation of objects of general shape via continuous extension and wavelet approximation”, *International Journal of Wavelets, Multiresolution and Information Processing*, vol. 8, no. 2, pp. 253–269.
55. 2010 **N. Saito** and Y. Wang, “The polynomial-Fourier transform with minimized mean square error for noisy data”, *Journal of Computational and Applied Mathematics*, vol. 234, no. 5, pp. 1586–1610.
56. 2010 Z. Zhang and **N. Saito**, “Ring-like structures of frequency domains of wavelets” *Applied and Computational Harmonic Analysis*, vol. 29, no. 1, pp. 18–29, 2010.
57. Z. Zhang and **N. Saito**, “Harmonic wavelet transform and image approximation.” *Journal of Mathematical Imaging and Vision*, vol. 38, no. 1, pp. 14–34, 2010.
58. L. Lieu and **N. Saito**, “Signal ensemble classification using low-dimensional embeddings and Earth Mover’s Distance,” in *Wavelets and Multiscale Analysis: Theory and Applications* (J. Cohen and A. Zayed, eds.), Chap. 11, pp.227–256, Birkhäuser, 2011.

#### Abstracts

1. 1991 **N. Saito** and K. Hsu, “Cross well tomography using curved rays and constraints,” in *Proceedings of the Seventh Workshop on Image and Multidimensional Signal Processing*, Paper 6.6, IEEE Signal Processing Society.
2. 1993 R. R. Coifman, F. Majid, and **N. Saito**, “Signal/noise separation using the adaptive waveform library,” *Proceedings of the Eighth Workshop on Image and Multidimensional Signal Processing*, pp. 136–137, IEEE Signal Processing Society.
3. 1994 R. R. Coifman and **N. Saito**, “Selection of best bases for classification and regression,” *Proceedings of 1994 IEEE-IMS Workshop on Information Theory and Statistics*, p. 51, Invited paper.
4. 1995 **N. Saito**, “Simultaneous denoising and compression of signals/images using a library of local orthonormal bases and the MDL criterion,” *Program of the 900th Meeting of the American Mathematical Society*, Abstract# 900-62-201, p. 448, Invited paper.
5. 1995 **N. Saito** and R. R. Coifman, “Local discriminant basis and its applications,” *Western Regional IMS/WNAR Meeting*, Abstract# 240-21, The Institute of Mathematical Statistics Bulletin, vol. 24, no. 2, pp. 180–181, Invited paper.
6. 1997 **N. Saito**, “Lithologic information extraction from acoustic well-logging waveforms using time-frequency wavelets,” American Geophysical Union Fall 1997 Meeting, Abstract # U41A-07, Invited paper.

7. 2000 B. M. Larson and **N. Saito**, “Analysis of the edge effects in local Fourier and brushlet dictionaries,” *Program of the 957th Meeting of the American Mathematical Society*, Abstract# 957-42-316, Invited paper.
8. 2001 B. M. Larson and **N. Saito**, “The continuous boundary local Fourier dictionary: A tool for local signal analysis and compression,” *SIAM Annual Meeting*, Final Program and Abstracts, p. 191, Invited paper.
9. 2001 **N. Saito**, “Stress parameter estimation from fracture surface topography using wavelets,” *Joint Statistical Meetings*, Abstracts, p. 273, Invited paper.
10. 2002 **N. Saito**, “Modeling and simulation of high-dimensional stochastic processes by the best sparsifying basis and the least statistically-dependent basis,” *The First SIAM Conference on Imaging Science*, Final Program and Abstracts, p. 33, Invited paper.
11. 2003 X. Shen and **N. Saito**, “Recovering piecewise bandlimited signals via a hierarchical system based on prolate spheroidal wave functions,” *Joint Mathematics Meetings*, Meeting #983, Abstract# 983-42-131, Invited paper.
12. 2003 **N. Saito** and J. Zhao, “A new  $U + V$  model for image representation and analysis using the elliptic boundary value problems and local Fourier analysis,” *37th Asilomar Conference on Signals, Systems, and Computers*, p. 25, Invited paper.
13. 2004 **N. Saito**, K. Yamatani, and J. Zhao, “Generalized Polyharmonic Local Trigonometric Transform for Image Analysis and Compression,” *The Second SIAM Conference on Imaging Science*, Final Program and Abstracts, p. 41.
14. 2005 **N. Saito** and K. Yamatani, “Polyharmonic Local Cosine Transform for Improving the Quality of Images Compressed by the JPEG Standard,” *The International Workshop on Computational Science and Its Education (IWCSE-2005)*, p. 20, 08/29- 09/02, 2005, Beijing, P. R. China.
15. 2005 **N. Saito**, “Analysis of images defined on a general shape domain using eigenfunctions of Laplacian,” *Proceedings of Annual Conference of Japan Society of Industrial and Applied Mathematics*, pp. 40–41.
16. 2006 **N. Saito** and X. Xue, “Image analysis on a general domain using Laplacian eigenfunctions,” *The Third SIAM Conference on Imaging Science*, Final Program and Abstracts, p. 38.
17. 2007 **N. Saito**, “Laplacian eigenfunctions: fast computation via commuting integral operators and applications to image analysis,” *Abstracts for 6th International Congress on Industrial and Applied Mathematics*, pp. 161-162.
18. 2008 **N. Saito**, B. Marchand, and L. Lieu, “Classification of underwater objects using synthetic aperture sonar images and waveforms,” *The Fourth SIAM Conference on Imaging Science*, Abstracts, p. 136.
19. 2008 **N. Saito**, “Can we hear the shape of neurons?,” *The Fourth SIAM Conference on Imaging Science*, Abstracts, p. 164.
20. 2010 **N. Saito** and L. Lieu, “Hyperspectral image classification by matching node connectivities,” *Abstracts of Papers Presented to the American Mathematical Society*, vol. 31, no. 1, pp. 194–195.
21. 2010 L. Lieu and **N. Saito**, “Signal ensemble classification on manifolds,” *The Thirteenth International Conference in Approximation Theory*, Abstracts, p. 35.
22. 2010 **N. Saito** and Q. Huynh, “Object classification and identification from acoustic color images,” *The fifth SIAM Conference on Imaging Science*, Final Program and Abstracts, pp. 81–82.
23. 2010 **N. Saito** and E. Woei, “On the localization behavior of graph Laplacian eigenfunctions over dendrite structures,” *The fifth SIAM Conference on Imaging Science*, Final Program and Abstracts, p. 95.
24. 2010 **N. Saito** and E. Woei, “On the localization behavior of graph Laplacian eigenfunctions,” *Proceedings of Annual Conference of Japan Society of Industrial and Applied Mathematics*, pp. 193–194.

**Papers Submitted**

1. **N. Saito** and E. Woei, “Simultaneous segmentation, compression, and denoising of signals using polyharmonic local sine transform and minimum description length criterion.”
2. X. Shen and **N. Saito**, “On Slepian series expansion for digitized signals.”
3. Z. Zhang and **N. Saito**, “Spectrum Properties of UEP framelets and MEP bi-framelets.”
4. L. Hermi and **N. Saito**, “On Rayleigh-Type formulas for a nonlocal boundary value problem associated with an integral operator commuting with the Laplacian.”
5. Y. Nakatsukasa, **N. Saito**, and E. Woei, “Mysteries around graph Laplacian eigenvalue 4.”

**Papers in Preparation**

1. X. Shen and **N. Saito**, “On Slepian series expansion for digitized signals.”
2. Z. Zhang and **N. Saito**, “Nonlinear approximation by PHLST/PHLCT with free knots.”