

## Curriculum Vitae of Ming-Jun Lai

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### Academic Degrees

B. S.	Jan., 1982	Hangzhou University, China
Ph. D.	Aug., 1989	Texas A&M University (Advisor: Charles K. Chui)

### Professional Experiences

1982-1984	Assistant Lecturer	Hangzhou University, China
1989-1992	Instructor	University of Utah, Utah, USA
1992-1995	Assistant Professor	University of Georgia, Georgia, USA
1995-2000	Associate Professor	University of Georgia, Georgia, USA
2000-present	Professor	University of Georgia, Georgia, USA
Jan.–May, 2003	Visiting Professor	Vanderbilt University, Tennessee, USA
Aug.–Dec., 2004	Visiting Professor	Georgia Institute of Technology, Atlanta, USA
April, 2006	Visiting Professor	University of Oslo, Norway

**Specialization:** Approximation Theory, Multivariate Splines, Numerical Analysis, Wavelet Analysis.

### Research and Related Activities

#### Publications

##### a. books (monograph as well as conference proceedings)

- [1] M. J. Lai and L. L. Schumaker, *Spline Functions over Triangulations*, 585+pages, Cambridge University Press, Cambridge, U.K. 2007.
- [2] G. Chen and M. J. Lai (edited), *Wavelets and Splines, Athens, 20005*, 515 pages, Nashboro Press, Brentwood, Nashville, 2006.

##### b. papers published in journals

- [3] M. J. Lai, On estimations for the exact bounds of the coefficients of approximation by cubic spline interpolation, *Math. Numer. Sinica* **6**(1984), pp. 105-108.
- [4] M. J. Lai and X. H. Wang, A note to the remainder of a multivariate interpolation polynomial, *J. Approx. & Appli.* **1**(1984), pp. 57-63.

- [5] M. J. Lai and G. J. Feng, On the uniform convergence of the Birkhoff interpolation with two points, *Math. Numer. Sinica* **6**(1984), pp. 222-224.
- [6] M. J. Lai, Exact error bounds for cubic Birkhoff spline interpolation, *Numerical Math. J. Chinese Univ.* **7**(1985), pp. 369-372.
- [7] M. J. Lai and X. H. Wang, On multivariate Newtonian interpolation, *Scientia Sinica* **29** (1986), pp. 23-32.
- [8] C. K. Chui and M. J. Lai, Computation of box splines and B-splines on triangulations of nonuniform rectangular partitions, *J.Approx.Th. & Applic.* **3-4**(1987), pp. 37-62.
- [9] C. K. Chui and M. J. Lai, Multivariate analog of Marsden's identity and a quasi-interpolation scheme, *Constructive Approximation* **3** (1987), pp. 111-122.
- [10] G. R. Chen, C. K. Chui and M. J. Lai, Construction of real-time spline quasi-interpolation scheme, *J. Approx. & Applic.* **4**(1988), pp. 61-75.
- [11] M. J. Lai, A remark on integer translates of a box spline, *J. Approx. & Applic.* **5**(1989), pp. 97-104.
- [12] C. K. Chui and M. J. Lai, Multivariate vertex splines and finite elements, *Journal of Approximation Theory* **60**(1990), pp. 245-343.
- [13] C. K. Chui and M. J. Lai, On bivariate super vertex splines, *Constructive Approximation* **6**(1990), pp. 399-419.
- [14] M. J. Lai, On dual functionals of polynomials in B-form, *Journal of Approximation Theory* **67**(1991), pp. 19-37.
- [15] M. J. Lai, Fortran subroutines for B-nets of box splines on three and four directional meshes, *Numerical Algorithm* **2**(1992), pp. 33-38.
- [16] C. K. Chui and M. J. Lai, Algorithms for generating B-nets and graphically displaying box spline surfaces, *Computer Aided Geometric Design* **8**(1992), pp. 479-493.
- [17] M. J. Lai, A characteristic theorem of multivariate splines in blossom form, *Computer Aided Geometric Design* **8**(1992), pp. 513-521.
- [18] M. J. Lai, Asymptotic formulae of multivariate Bernstein approximation, *Journal of Approximation Theory* **70**(1992), pp. 229-242.
- [19] M. J. Lai, Some Sufficient Conditions for Convexity of Multivariate Bernstein-Bézier Polynomials and Box Spline Surfaces, *Studia Scientiarum Math. Hungarica* **28**(1993), pp. 363-374.
- [20] M. J. Lai, A Serendipity Family of Locally Supported Splines in  $S_8^2(\Delta)$ , *Journal of Approximation Theory and its Application* **10**(1993), pp. 43-53.
- [21] M. J. Lai, On computation of Battle-Lemarie's wavelets, *Mathematics of Computation* **63**(1994), pp. 689-699.
- [22] M. J. Lai, On Strömberg's spline wavelets, *Applied and Computational Harmonic Analysis* **1**(1994), pp. 188-193.
- [23] M. J. Lai, Approximation order from bivariate  $C^1$  cubics on a four-directional mesh is full, *Computer Aided Geometric Design* **11**(1994), pp. 215-223.
- [24] M. J. Lai, On the digital filter associated with Daubechies' wavelets, *IEEE Transactions on Signal Processing* **43**(1995), pp. 2203-2205.
- [25] M. J. Lai, Scattered data interpolation and approximation by  $C^1$  piecewise cubic polynomials, *Computer Aided Geometric Design* **13**(1996), pp. 81-88.

- [26] M. J. Lai, On the fundamental solutions for multivariate singular interpolation, *Journal of Approximation Theory and its Application* **12**(1996), pp. 73–92.
- [27] M. J. Lai and P. Wenston, On multilevel bases for elliptic boundary value problems, *Journal of Computational and Applied Mathematics* **71**(1996), pp. 95–113.
- [28] M. J. Lai, On  $C^2$  quintic spline functions over triangulations of Powell-Sabin’s type, *Journal of Computational and Applied Mathematics* **73**(1996), pp. 135–155.
- [29] M. J. Lai, Geometric interpretation of smoothness conditions of triangular polynomial patches, *Computer Aided Geometric Design* **14** (1997), pp. 191–199.
- [30] M. J. Lai and L. L. Schumaker, Scattered data interpolation using piecewise polynomials of degree six, *SIAM Journal on Numerical Analysis* **34**(1997), pp. 905–921.
- [31] W. He and M. J. Lai, On digital filters associated with bivariate box spline wavelets, *Journal of Electronic Imaging* **6**(1997), pp. 453–466.
- [32] M. J. Lai and L. L. Schumaker, Approximation power of bivariate splines, *Advances in Computational Mathematics* **9**(1998), pp. 251–279.
- [33] W. He and M. J. Lai, Construction of bivariate compactly supported biorthogonal box spline wavelets with arbitrarily high regularities, *Journal of Applied Computational Harmonic Analysis* **6**(1999), pp. 53–74.
- [34] M. J. Lai and L. L. Schumaker, On the approximation power of splines on triangulated quadrangulations, *SIAM Journal on Numerical Analysis* **36** (1999), pp. 143–159.
- [35] M. J. Lai and P. Wenston, On Schwarz’s domain decomposition methods for elliptic boundary value problems, *Numerische Mathematik***84**(2000), pp. 475–495.
- [36] M. J. Lai and P. Wenston, Bivariate spline method for numerical solution of Navier-Stokes equations over polygons in stream function formulation, *Numerical Methods for P.D.E.* **16**(2000), pp. 147–183.
- [37] W. He and M. J. Lai, Examples of bivariate nonseparable compactly supported orthonormal continuous wavelets, *IEEE Transactions on Image Processing* **9**(2000), pp. 949–953.
- [38] C. K. Chui and M. J. Lai, Filling polygonal holes using  $C^1$  cubic triangular spline patches, *Computer Aided Geometric Design* **17**(2000), pp. 297–307.
- [39] M. J. Lai, Convex preserving scattered data interpolation using bivariate  $C^1$  cubic splines, *Journal of Computational and Applied Mathematics* **119**(2000), pp. 249–258.
- [40] C. K. Chui, M. J. Lai, and J. Lian, Algorithms for  $G^1$  connection of multiple parametric bicubic NURBS surfaces, *Numerical Algorithms***23** (2000), pp. 285–313.
- [41] M. J. Lai and L. L. Schumaker, Macro-Elements and Stable Local Bases for Splines on Clough-Tocher Triangulations, *Numerische Mathematik***88**(2001), pp. 105–119.
- [42] X. H. Wang, C. Li, and M. J. Lai, An Unified Convergence Theory for Newton’s Type Methods for Zeros of Nonlinear Operators in Banach spaces, *BIT***42**(2002), pp. 206–213.
- [43] M. J. Lai and L. L. Schumaker, Quadrilateral macro-elements, *SIAM Journal on Mathematical Analysis***33**(2002), pp. 1107–1116.
- [44] M. von Golitschek, M. J. Lai, L. L. Schumaker, Bounds for minimal energy bivariate polynomial splines, *Numerische Mathematik***93**(2002), pp. 315–331.
- [45] M. J. Lai and L. L. Schumaker, Macro-Elements and Stable Local Bases for Splines on Powell-Sabin Triangulations, *Mathematics of Computation* **72**(2003), pp. 335–354.

- [46] M. J. Lai, C. Liu and P. Wenston, Bivariate spline method for numerical solution of time evolution Navier-Stokes equations over polygons in stream function formulation, *Numerical Methods for P. D. E.*, **19**(2003), 776–827.
- [47] W. He and M. J. Lai, Construction of Trivariate Compactly Supported Biorthogonal Box Spline Wavelets, *Journal of Approximation Theory* **120**(2003), pp. 1–19.
- [48] M. J. Lai and P. Wenston,  $L^1$  spline methods for scattered data interpolation and approximation, *Advances in Computational Mathematics*, **21**(2004), 293–315.
- [49] M. J. Lai and A. LeMehaute, A new kind of trivariate  $C^1$  spline space, *Advances in Computational Mathematics*, **21** (2004), 273–292.
- [50] M. J. Lai, Chun Liu and P. Wenston, On two nonlinear biharmonic evolution equations: existence, uniqueness and stability, *Applicable Analysis*, **83**(2004), 541–562.
- [51] M. J. Lai, Chun Liu and P. Wenston, Numerical Simulations on two nonlinear biharmonic evolution equations, *Applicable Analysis*, **83**(2004), 563–577.
- [52] M. J. Lai and P. Wenston, Bivariate Splines for Fluid Flows, *Computers and Fluids* **33**(2004), pp. 1047–1073.
- [53] X. H. Wang, M. J. Lai, S. Yang, On divided differences of the remainder of polynomial interpolation, *J. Approximation Theory* **127**(2004), pp. 193–197.
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- [55] G. Awanou and M. J. Lai, On convergence rate of the augmented Lagrangian algorithm for nonsymmetric saddle point problems, *Journal of Applied Numer. Math.*, **54**(2005), 122–134.
- [56] X. Wang, H. Wang, and M. J. Lai, Some Results on Numerical Divided Difference Formulas, *Scientia Sinica, Ser. A.*, **35**(2005), 712–720.
- [57] M. J. Lai, Construction of multivariate compactly supported orthonormal wavelets, *Advances in Computational Mathematics* **25**(2006), 41–56.
- [58] V. Baramidze, M. J. Lai, and C. K. Shum, Spherical Splines for Data Interpolation and Fitting, *SIAM J. Scientific Computing*, **28**(2006), 241–259.
- [59] J. Geronimo and M. J. Lai, Factorization of multivariate positive Laurent polynomials, *J. Approximation Theory*, **139**(2006), 327–345.
- [60] M. J. Lai and J. Stoeckler, Construction of multivariate compactly supported tight wavelet frames, *Applied and Comput. Harmonic Analysis*, **21**(2006), 324–348.
- [61] M. J. Lai, Construction of multivariate compactly supported prewavelets in  $L_2$  spaces and pre-Riesz basis in Sobolev spaces, *Journal of Approximation Theory*, **142**(2006), 83–115.
- [62] M. J. Lai, A. Le Mehaute and T. Sorokina, An octahedral  $C^2$  macro-element, *Comp. Aided Geom. Design* **23**(2006), pp. 640–654.
- [63] M. J. Lai and L. L. Schumaker, Trivariate  $C^r$  polynomial macro-elements, *Constructive Approx.*, **26**(2007) 11–28.
- [64] M. J. Lai and A. Petukhov, The method of virtual components for constructing wavelet frames, *Applied and Comput. Harmonic Analysis* **22**(2007) 304–318.
- [65] M. J. Lai, Convergence of three  $L_1$  spline methods for data interpolation and fitting, *Journal of Approximation Theory*, **145**(2007), 196–211.

- [66] X. Hu, D. Han and M. J. Lai, Bivariate splines of various degrees for numerical solution of PDE, *SIAM J. Scientific Computing*, 29(2007) 1338–1354.
- [67] T. Zhou, D. Han and M. J. Lai, Energy minimization method for scattered data Hermite interpolation, *J. Applied Num. Math.*, 58(2008), 646–659.
- [68] S. Kersey and M. J. Lai, convergence of local variational spline interpolation, *Journal of Mathematical Analysis and Applications*, 314(2008), 398–415.
- [69] M. J. Lai and L. L. Schumaker, Domain decomposition method for scattered data fitting, *SIAM J. Numerical Analysis*, *SIAM J. Numerical Analysis*, 47(2009), 911-928.
- [70] S. Foucart and M. J. Lai, Sparsest Solutions of Underdetermined Linear Systems via  $\ell_q$ -minimization for  $0 \leq q \leq 1$ , *Applied and Computational Harmonic Analysis*, 26(2009) 395–407.
- [71] M. J. Lai, C. K. Shum, V. Baramidze, and P. Wenston, Triangulated spherical splines for geopotential reconstruction, *J. of Geodesy*, 83 (2009), 695–708.
- [72] M. J. Lai and A. Petukhov, Method of Virtual Components in the Multivariate Setting, accepted for publication in *J. of Fourier Analysis and Its Applications*, 2009.
- [73] M. J. Lai and K. Nam, On the number of tight wavelet framelets associated with multivariate box splines, accepted by *J. of Approximation Theory and its Analysis*, 2008.
- [74] M. J. Lai, On sparse solution of underdetermined linear systems, accepted for publication in *Journal of Concrete and Applicable Mathematics*, 2009,

**c. papers appeared in refereed conference proceedings**

- [75] C. K. Chui and M. J. Lai, On bivariate vertex splines, in *Multivariate Approximation theory III*, W.Schempp & K.Zeller, eds., Birkhäuser, 1985, pp. 84-115.
- [76] C. K. Chui and M. J. Lai, VanderMonde determinants and Lagrange interpolation in  $\mathbf{R}^s$ , *Nonlinear and Convex analysis*, B.L.Lin & S.Simons eds., Marcel Dekker, 1987, pp. 23-35.
- [77] C. K. Chui and M. J. Lai, On multivariate vertex splines and applications, in *Topics in Multivariate Approximation*, Chui, C.K., L.L. Schumaker, and F. Utreras eds. Academic Press, 1987, pp. 19-36.
- [78] M. J. Lai, A matrix approach to computations of various wavelets, *Proceedings of IMACS World Congress*, 1(1994), pp. 284–286.
- [79] M. J. Lai, Bivariate spline spaces on FVS-triangulations, in *Approximation Theory VIII*, C. K. Chui and L. L. Schumaker, (eds.), Academic Press, 1995, pp. 309–316.
- [80] M. J. Lai, Bivariate box splines for image processing, in *Wavelet Applications in Signal and Image Processing IV*, proceedings of SPIE, vol. 2825 (1996), pp. 474–487.
- [81] W. He and M. J. Lai, Examples of bivariate nonseparable compactly supported orthonormal continuous wavelets, in *Wavelet Applications in Signal and Image Processing IV*, proceedings of SPIE, vol. 3169 (1997), pp. 303–314.
- [82] M. J. Lai and P. Wenston, Bivariate spline method for numerical solution of steady state Navier-Stokes equations over polygons in stream function formulation, in *Advances in Computational Mathematics*, edited by Z. Chen, Y. Li, C. Micchelli, and Y. Xu, Marcel Dekker, New York, 1998, pp. 245–277.

- [83] W. He and M. J. Lai, Bivariate box spline wavelets in Sobolev spaces, in *Wavelet Applications in Signal and Image Processing VI*, proceedings of SPIE, vol. 3458(1998), pp. 56–66.
- [84] W. He and M. J. Lai, A New Sufficient Condition for the Orthonormality of Refinable Functions, in *Approximation Theory IX: Computational Aspects*, Charles K. Chui and Larry L. Schumaker (eds.) Vanderbilt University Press (Nashville), 1998, pp. 121–128.
- [85] K. W. Farmer and M. J. Lai, Scattered Data Interpolation by  $C^2$  Quintic Splines Using Energy Minimization, in *Approximation Theory IX: Computational Aspects*, Charles K. Chui and Larry L. Schumaker (eds.) Vanderbilt University Press (Nashville), 1998, pp. 47–54.
- [86] M. J. Lai and P. Wenston, Bivariate Spline Method for Navier-Stokes Equations: Domain Decomposition Technique in *Approximation Theory IX: Computational Aspects*, Charles K. Chui and Larry L. Schumaker (eds.) Vanderbilt University Press (Nashville), 1998, pp. 153–160.
- [87] M. J. Lai and D. W. Roach, Nonseparable symmetric wavelets with short support, *Proceedings of SPIE Conference on Wavelet Applications in Signal and Image Processing VII*, Vol. 3813, pp. 132–146, July 1999.
- [88] M. J. Lai and P. Wenston, Trivariate  $C^1$  cubic splines for numerical solution of biharmonic equations, in: *Trends in Approximation Theory*, K. Kopotun, T. Lyche, and M. Neamtu (eds.), Vanderbilt University Press, Nashville, 2001, pp. 224–234.
- [89] M. J. Lai, and D. W. Roach, The nonexistence of bivariate symmetric wavelets with short support and two vanishing moments, in: *Trends in Approximation Theory*, K. Kopotun, T. Lyche, and M. Neamtu (eds.), Vanderbilt University Press, Nashville, 2001, pp. 213–223.
- [90] M. J. Lai and D. Roach, Parameterizations of univariate orthogonal wavelets with short support, in *Approximation Theory X: Wavelets, Splines, and Applications*, edited by C. K. Chui, L. L. Schumaker, J. Stoeckler, Vanderbilt Univ. Press, 2002, pp. 369–384.
- [91] M. J. Lai, P. Wenston, L. A. Ying, Bivariate splines for exterior biharmonic equations, in *Approximation Theory X: Wavelets, Splines and Applications*, edited by C. K. Chui, L. L. Schumaker, J. Stoeckler, Vanderbilt Univ. Press, 2002, pp. 385–404.
- [92] G. Awanou and M. J. Lai,  $C^1$  quintic spline interpolation over tetrahedral partitions, in *Approximation Theory X: Wavelets, Splines and Applications*, edited by C. K. Chui, L. L. Schumaker, J. Stoeckler, Vanderbilt Univ. Press, 2002, pp. 1–16.
- [93] M. J. Lai, Methods for constructing nonseparable compactly supported orthonormal wavelets, in *Wavelet Analysis: Twenty Year's Development*, edited by D. X. Zhou, World Scientific, 2002, pp. 231–251.
- [94] V. Baramidze and M. J. Lai, Volume data interpolation by tensor products of spherical and radial splines, in *Advances in Constructive Approximation*, edited by M. Neamtu and E. Saff, Nashboro Press, 2004, pp. 75–88.
- [95] V. Baramidze and M. J. Lai, Error Bounds for Minimal Energy Interpolatory Spherical Splines, *Approximation Theory XI*, Nashboro Press, 2005, pp. 25–50.
- [96] G. Awanou, M. J. Lai, P. Wenston, The multivariate spline method for numerical

solution of partial differential equations, in *Wavelets and Splines*, Nashboro Press, Brentwood, 2006, pp. 24–74.

- [97] V. Baramidze and M. J. Lai, Spherical spline solution to a PDE on the sphere, in *Wavelets and Splines*, Nashboro Press, Brentwood, 2006, pp. 75–92.
- [98] O. Cho and M. J. Lai, A class of compactly supported orthonormal B-Spline wavelets, in *Wavelets and Splines*, edited by G. Chen and M. J. Lai, Nashboro Press, 2006, pp. 123–151.
- [99] M. J. Lai, J.-A. Lian, P. Cassidy, Removal of Gaps among Compound  $C^1$  Bi-Cubic Parametric B-spline Surfaces, in *Wavelets and Splines*, edited by G. Chen and M. J. Lai, Nashboro Press, 2006, pp. 287–313.
- [100] M. J. Lai and K. Nam, Tight Wavelet Frames over Bounded Domains, in *Wavelets and Splines*, edited by G. Chen and M. J. Lai, Nashboro Press, 2006, pp. 314–327.
- [101] M. J. Lai, Multivariate splines for data fitting and approximation, the conference proceedings of the 12th Approximatin Theory, San Antonio, 2007, edited by M. Neamtu and L. L. Schumaker, Nashboro Press, 2008, Brentwood, TN, pp. 210–228.
- [102] M. J. Lai, B. Lucier, and J. Wang, The convergence of a central difference discretization of Rudin-Osher-Fatemi model for image denoising, Proceedings of SSVM 2009, X.-C.Tai et al (Eds), pp. 514–526.

#### **d. papers submitted for publication**

- [103] S. Guillas and M. J. Lai, Bivariate splines for functional data analysis, 2008.
- [104] V. Baramidze and M. J. Lai, Convergence of discrete and penalized least squares of spherical splines, 2009.

#### **e. under preparation**

- [105] M. J. Lai and T. Lyche, Trigonometric B-spline Tight Wavelet Frames, 2009.
- [106] B. Ettinger, S. Guillas, M. J. Lai, Bivariate Splines for Functional Regression Models with Application to Ozone Forecasting, 2008.

### **Invited Presentations**

- June, 1992 Invited to give a talk at Chevron Oil Field Research Company, 1300 Beach Boulevard, La Habra, California.
- Oct., 1992 Invited to give a colloquium talk at Department of Mathematics, Vanderbilt University, Nashville, Tennessee.
- April, 1993 Invited to give a colloquium talk at Department of Mathematics, Georgia Institute of Technology, Atlanta, Georgia.
- May 1, 1993 Invited to give a 20 minute talk at a conference on interaction between operator, wavelets, and control theory at Charlotte, University of North Carolina at Charlotte.
- Mar. 2, 1995 Invited to give a 20 minute talk at an international conference on scattered data fitting in Cancun, Mexico.
- Aug. 22, 1996 Invited to give seminar talks at Dept. of Math., Nankai University, Tianjin, China.
- May 10, 1997 Invited to give a 30 minute talk at an international conference on Multivariate Approximations at Oberwolfach, Germany

- Aug. 12, 1997     Invited to give a 30 minute talk at an international conference on computational mathematics at Guangzhou, China.
- July 28–Aug. 2, 1998     Invited to give a 30 minute talk at the eighth international congress of applied and computational mathematics at Lueven, Belgium.
- Dec. 12–16, 1998     Invited to give a 30 minute talk at the first international congress of Chinese mathematicians at Beijing, China.
- Mar. 18, 1999     Invited to give a seminar talk at Dept. of Math. Penn. State Univ., University Park, Penn.
- April 16–20, 1999     Invited to give a 30 minute talk at the second international conference on scattered data interpolation in Peuto Vallata, Mexico.
- June 17, 1999     Invited to give a seminar talk at Dept. of Math. University of Nante, France.
- Nov. 2–7, 1999     Invited to give a 30 minute talk at the SIAM conference on computer aided geometric design in Albuquerque, New Mexico.
- Mar. 6, 2000,     Invited to give a colloquium talk at Dept. of Math. University of Missouri at St. Louis, Missouri. The talk title is "Multivariate Splines: Theory and Its Applications".
- April 10, 2000,     Invited to give a colloquium talk at Dept. of Mathematics, Temple University, Philadelphia. The talk title is "Multivariate Splines: Theory and Applications".
- June 1, 2000     Invited to give a seminar talk at Dept. of Applied Math., School of Mathematical Sciences, Peking Univ., Beijing, China. The talk title is "Multivariate Splines for Numerical Solution of PDE's".
- June 8–22, 2000     Invited to give seminar talks at Dept. of Math., City Univ. of Hong Kong, China. The talk titles are "Multivariate Splines and Numerical Solution of PDE's."
- June 23, 2000     Invited to give a seminar talk at Dept. of Math., Zhongshan University, Guangzhou, China. The talk title is "Multivariate Splines for Scattered Data Interpolation".
- July 2, 2000     Invited to give a seminar talk at Dept. of Math., Zhejiang University, Hangzhou, China. The talk title is "Methods for Constructing Nonseparable Orthonormal Wavelets".
- March 9, 2001     Invited to give a seminar talk at Dept. of Math., University of Michigan, Ann Arbor, Michigan, U.S.A. The talk title is "Multivariate Splines for Fluid Flow Simulation".
- May 2, 2001     Invited to give a seminar talk at Dept. of Math., University of Wisconsin, Madison, Wisconsin, U.S.A. The talk title is "Multivariate Splines for Navier-Stokes Equations".
- May 31, 2001     Invited to give a seminar talk at Dept. of Math., Zhejiang University, Hangzhou, China. The talk title is "Multivariate Splines for PDE's".
- Nov. 6, 2001     Invited to give a 30 minute talk at Geometric Design and computing, a SIAM conference at Sacramento, California. The talk title is "The L1 spline method for scattered data interpolation".
- April 10, 2002,     Invited to give a seminar talk at School of Mathematics, Georgia Institute of Technology, Atlanta, Georgia. The talk title is "Construction of Compactly Supported Orthonormal Wavelets".

- April 20, 2002, Invited to give a seminar talk at Dept. of Mathematics, Texas A&M University, College Station, Texas. The title of talk is "Multivariate Splines and Its Applications".
- May 23, 2002, Invited to give a seminar talk at Dept. of Computer Science and Engineering, Brigham Young University, Provo, Utah. "Multivariate Splines for Applications".
- July 8, 2002 Invited to give a 30 minutes talk at SIAM Annual conference at Philadelphia. The title of talk is "Multivariate Splines for PDE's".
- Sept 22–27, 2002 Invited to give a 30 minutes talk at an international conference on Multivariate Approximation, Haus Bommerholz, Germany. The title of the talk is "Multivariate Splines for Applications".
- Nov. 26, 2002 Invited to give a seminar talk at Department of Mathematics, University of Maryland. The title of talk is "Multivariate Splines for Numerical Solution of PDE's".
- Dec. 20–23, 2002 invited to give a 40 minute talk at an international conference on computational mathematics, Zhongshan University, Guangzhou, China. The talk title is "Construction of Compactly Supported Tight Frames".
- March 18, 2003 invited to give a seminar talk at the Department of Mathematics, Vanderbilt University. The talk title is "Construction of Compactly Supported Prewavelets in Sobolev Spaces."
- Nov. 12, 2003 invited to participate a minisymposium and present a talk at the Geometric Design and Computing at Seattle, WA. The talk title is "Construction of Compactly Supported Vertex Splines"
- Nov. 12, 2003 organized a minisymposium during the Geometric Design and Computing at Seattle, WA. The minisymposium title is "Spherical Data Interpolation and Approximation".
- Dec. 8, 2003 invited to attend a workshop at Dept. of Math., Vanderbilt University and presented a talk on "Spherical Splines for Scattered Data Interpolation".
- Aug. 18–Oct. 5, 2004 presented two talks on in the Analysis seminar, one talk in the PDE seminar, and one talk in the Applied Math. seminar at School of Mathematics, Georgia Institute of Technology.
- Dec. 8, 2004 invited to give a colloquium talk at the College of Software Engineering, Georgia Southern Polytech. State University. The talk title is "Box Spline Tight Wavelet Frames for Image Edge Detection".
- Sept. 15, 2005 invited to give a colloquium talk at the Department of Statistics, University of Georgia. The talk title is "Spherical Splines for Scattered Data Fitting".
- Oct. 21, 2005 invited to give a colloquium talk at the Georgia Southern University. The talk title is "Spherical Splines for Scattered Data Fitting".
- Nov. 2, 2005 organized a minisymposium during the Geometric Design and Computing at Pheonix, AR. The minisymposium title is "Spherical Spline Approximation".
- Feb. 24, 2006 invited to give a keynote speech at the Eleventh Annual Mathematics Technology Conference at Valdosta State University. The talk title is "Multivariate Splines and Their Applications".
- April 18, 2006 invited to give a colloquium talk at the Center of Mathematics for Application, University of Oslo, Oslo, Norway. The talk title is "Multivariate Splines for Numerical Solution of PDE's".

- March 3–8, 2007 invited to give a plenary speech at the Twelveth Approximation Theory Conference at San Antonia, TX. The talk title is "Multivariate Splines for Data Fitting".
- March 9, 2007 invited to give a colloquium talk at Texas A&M University, Prairie View, Texas. The talk title is "Box spline tight wavelet frames and their applications".
- June 18–23, 2007 invited to give a 40 minutes talk at international conference on Applied and Computational Harmonic Analysis at Fudan University, Shanghai. The talk title is "The virtual component method in the multivariate setting".
- June 25, 2007 invited to give a talk at Nanjing University, Nanjing, China. The talk title is "multivariate splines for data fitting and approximation".
- Sept. 13–14, 2007 invited to give two colloquium talks at Northern Illinois University, DeKalb, Illinois.
- Oct. 15, 2007 invited to give a colloquium talk at Dept. of Statistics, Harvard University.
- Mar. 11, 2008 invited to give a colloquium talk at Department of Applied Math., Cambridge University, England.
- March 31, 2008 invited to give a seminar talk at Department of Math., Penn. State University.
- May 13–15, 2008 invited to give two seminar talks at Department of Mathematics, Zhongshan University.
- Oct. 30, 2008, invited to give a seminar talk at Department of Mathematics, Harvard University, Cambridge, Boston.
- Jan. 26, 2009, invited to give a seminar talk at School of Mathematics, Georgia Institute of Technology Atlanta, Georgia.
- Feb. 19, 2009, invited to give a Seminar Talk at Department of Mathematics, University of Alabama, Tuscaloosa.
- March 5, 2009, invited to give a Seminar Talk at Department of Mathematics at the Renmin University, Beijing, China.

### **Research Grants**

- Dec., 1989 P. I. on a Faculty Grant from the University of Utah Research Committee.
- Sept. 8, 1993 P. I. on a research grant from National Science Foundation (#DMS9303121) for three years 1993–1996 for an amount \$60,000.
- July 15, 1994 P. I. on an equipment supplement from National Science Foundation for an amount \$11,200 and a matching from the State of Georgia.
- Sept. 10, 1996 P. I. on an equipment supplement from National Science Foundation for an amount \$4,896 and a matching from the State of Georgia.
- Aug. 1, 1998 P. I. on a research grant from National Science Foundation (#9870178) for three years 1998–2001 for an amount \$70,334.
- Jan. 10, 2001 co.-P. I. on a VIGRE grant from National Science Foundation (#DMS 0089927) for five years 2001–2005 for an amount \$2,450,000.
- March 18, 2002 P. I. on a conference grant from the U. S. Army Research Office for an amount \$4,448.
- July 1, 2003 P. I. on a computer equipment grant from the U.S. Army Research Office (# 44659-MA-RIP) for an amount \$54,179.

- Sept. 1, 2003 P. I. on a collaborative mathematical research grant from the National Science Foundation (#EAR-0327577) for four years 2003–2007 for an amount \$250,166.
  - April 12, 2004 P. I. on a conference grant from the U. S. Army Research Office for an amount \$13,293.
  - Sept. 15, 2004 P. I. on a conference grant from the National Science Foundation for an amount \$18,000.
  - April, 2007 co-P.I. on a data grant from the European Space Agency for free access of the geopotential data from satellite GOCE.
  - Sept. 1, 2007 P.I. with co-PI A. Petukhov on a research grant from the National Science Foundation (#DMS 0713807) for an amount \$215,855.
- Total Amount of Federal Grants Received: \$702,373.**

### Research Awards

- April 2, 2003, received a Creative Research Medal Award from the University of Georgia Research Foundation.

### Teaching and Related Activities

#### Graduate Student Supervision

#### Students graduated

- [1] Jiangxiang Liu, Masters of Sciences, graduated in Aug. 1995.
- [2] Kathleen Farmer, Masters of Sciences, graduated in Aug., 1997. She is now an instructor at Dept. of Math., North Louisiana State University.
- [3] Richard Tatum, Masters of Applied Mathematics and Sciences, graduated in Aug., 1999. He is now a scientist at Naval Surface Warfare Center, VA.
- [4] Victoria Baramidze, Masters of Applied Mathematics and Sciences, graduated in Aug., 1999.
- [5] Wenjie He, graduated with Ph.D. in Aug., 1998. He is now an associate professor at Dept. of Math. and Computer Science, University of Missouri at St. Louis, Missouri.
- [6] Xiangming Xu, graduated with Ph.D. in May, 2001. He is now a software engineer at Telchemy company in Atlanta.
- [7] Gerard Awanou, graduated with Ph.D. in Aug. 2003. He is now a post-doc associate at the Institute for Mathematics and Applications at University of Minnesota. He is now an assistant professor at Dept. of Math., Northern Illinois University, DeKalb, Illinois.
- [8] Victoria Baramidze, graduated with Ph.D. in Aug. 2005, She is now an assistant professor at West Illinois University.
- [9] Kyunglim Nam, graduated with Ph.D. in Aug. 2005. She was a visiting assistant professor at University of Toledo, Toledo, Ohio. She is now married and takes care of her baby at home.
- [10] Jie Zhou, graduated with Ph.D. in Aug., 2006. He is an assistant professor at Department of Mathematics, Coastal Carolina University in fall, 2007.
- [11] Okkyung Cho, graduated with Ph.D. in Aug., 2006. She is a visiting assistant professor at University of Toledo, Toledo, Ohio in this fall, 2006.

- [12] Haipeng Liu, graduated with Ph. D. in Aug. 2007. He is a lecturer at Georgia State University, 2007.
- [13] Jianbao Wu, graduated with Ph. D. in Aug. 2007.
- [12] Bree Ettinger, graduated with Ph. D. in Aug. 2009. She will be a lecturer at Georgia State University starting from fall, 2009.

**Students (after qualifying exams) under Supervision:**

- Jiangying Hong, Ph. D. student working on wavelet analysis.
- Leopold Matamba Messi, Ph. D. student working on multivariate splines for numerical solution of partial differential equations.

**Research Experience for Undergraduate Students** Katie Agle, James Alexander, Dustin Burn, Coop Cunliffe, Grant Fiddymont, , Max Mautner, and Terik Trent for seven weeks in the summer, 2008.

**Courses taught at University of Georgia**

- [1] Summer, 1992 Analytic Geometry and Calculus
- [2] Fall, 1992 Introduction to Numerical Analysis
- [3] Winter, 1993, MAT253 Analytic Geometry and Calculus
- [4] Winter, 1993, MAT404/604 Introduction to Numerical Analysis
- [5] Spring, 1993, MAT405/605, Introduction to Numerical Analysis
- [6] Summer, 1993, MAT254, Integral Calculus
- [7] Fall, 1993 , MAT254, Integral Calculus
- [8] Fall, 1993 MAT833, Advanced Numerical Analysis
- [9] Winter, 1994, MAT834, Advanced Numerical Analysis
- [10] Spring, 1994, MAT835, Advanced Numerical Analysis
- [11] Winter, 1995, MAT253, Analytic Geometry and Calculus
- [12] Winter, 1995 Mat403/603, Introduction to Numerical Analysis,
- [13] Spring, 1995 Mat404/604, Introduction to Numerical Analysis
- [14] Spring, 1995 Mat254, Integral Calculus
- [15] Fall, 1995 Mat833, Advanced Numerical Analysis
- [16] Winter, 1996 Mat834, Advanced Numerical Analysis
- [17] Spring, 1996 Mat835, Advanced Numerical Analysis
- [18] Spring, 1996 Mat894, Wavelet Analysis
- [19] Summer, 1996 Mat254, Integral Calculus
- [20] Fall, 1996 Mat833, Advanced Numerical Analysis
- [21] Winter, 1997 Mat834, Advanced Numerical Analysis
- [22] Spring, 1997 Mat835, Advanced Numerical Analysis
- [23] Fall, 1997 Mat894, Wavelet Analysis
- [24] Fall, 1997 Mat253, Differential Calculus
- [25] Winter, 1998 Mat894, Wavelet Analysis
- [26] Spring, 1998 Mat894, Wavelet Analysis
- [27] Fall, 1998 Mat8500, Advanced Numerical Analysis
- [28] Fall, 1998 Mat2200, Differential Calculus

- [29] Spring, 1999 Mat8510, Advanced Numerical Analysis,
- [30] Fall, 1999 Mat2200, Differential Calculus,
- [31] Fall, 1999 Mat8500, Advanced Numerical Analysis
- [32] Spring, 2000, Mat8770, Partial Differential Equations
- [33] Spring, 2000, Mat2200, Differential Calculus
- [34] Fall, 2000 Mat8550, Special Topics in Numerical Analysis
- [35] Fall, 2000 Mat2200, Differential Calculus
- [36] Spring, 2001, Math2210, Integral Calculus
- [37] Fall, 2001, Math8550, Special Topics in Numerical Analysis,
- [38] Fall, 2001, Math2200, Differential Calculus
- [39] Fall, 2001, Fres 1010, Freshman Seminar
- [40] Summer, 2001, Math 2200, Differential Calculus
- [41] Spring, 2002, Math8550, Special Topics in Numerical Analysis,
- [42] Spring, 2002, Math2200, Differential Calculus
- [43] Summer, 2002, Math 2500, Multivariate Calculus.
- [44] Fall, 2002, Math2200, Differential Calculus
- [45] Fall, 2002, Math2200, Differential Calculus
- [46] Fall, 2002, Math8500, Advances in Numerical Analysis
- [47] Summer, 2003, Math2210, Integral Calculus
- [48] Fall, 2003, Math2210, Integral Calculus
- [49] Fall, 2003, Math8510, Advances in Numerical Analysis
- [50] Fall, 2003, Fres 1010, Freshmen Seminar
- [51] Spring, 2004, Math2500, Multivariate Calculus
- [52] Spring, 2005, Math2210, Integral Calculus
- [53] Spring, 2005, Math8500, Advanced Numerical Analysis
- [54] Fall, 2005, Math2210, Integral Calculus
- [55] Fall, 2005, Math8550, Special Topic on Numerical Analysis
- [56] Fall, 2006, Math2500, Multivariable Calculus
- [57] Fall, 2006, Math8500, Advanced Numerical Analysis
- [58] Spring, 2007, Math8770, Partial Differential Equation
- [59] Fall, 2007, Math8510, Advanced Numerical Analysis II
- [60] Fall, 2007, Math2500, Multivariate Calculus
- [61] Spring, 2008, Math. 3200, Sequence and Series
- [62] Fall, 2008, Math2500, Multivariate Calculus
- [63] Fall, 2008, Math4500, Numerical Analysis
- [64] Spring, 2009, Math4510, Numerical Analysis II

## **Service and Related Activities**

### **Departmental Committees**

- 1996–1998, member of the departmental facility committee
- 1997, member of CITF, University of Georgia
- 1998–2000, member of the departmental personnel committee
- 2001, chair of Kossack calculus committee

- 2000–2002, member of the departmental graduate committee
- 2002, member of Kossack calculus committee
- 2003–2005, member of college promotion and tenure committee
- 2005–2006, member of college promotion and tenure committee
- March, 2006, chair of the 3rd year review committee for Dr. Sornborger.
- 2005–2007, member of the departmental facilities committee
- 2007–2009, member of the departmental personnel committee
- 2008–2009, chair of the departmental personnel committee
- 2009–2010, member of the departmental executive committee

### **Conferences organized**

- April 11–13, 1997, chair of the organizing committee of the eighth southeastern approximation theory conference at University of Georgia, Athens.
- March 23–24, 2002, chair of the organizing committee of the tenth southeastern approximation theory conference at University of Georgia, Athens.
- May 16–19, 2005, chair of the organizing committee of the international conference on Wavelets and Splines at Athens, Georgia. It was attended by more than 100 people from 14 countries including plenary speakers Ingrid Daubechies from Princeton, David Donoho from Stanford University, Mauro Maggnioni from Yale University, Schumaker from Vanderbilt University as well as Program director Dr. Mike Coyle from the Army Research Office.
- Jan. 20 –Dec. 30, 2007, organizing the departmental applied math. seminar.
- Jan. 12 –Dec. 30, 2008, organizing the departmental applied math. seminar.

### **Referee for following journals and funding agencies:**

Advanced in Computational Math., BIT, Computer Aided Geometric Design, Computers and Mathematics with Applications, Constructive Approximation, Journal of Approximation Theory, Journal of Computational and Applied Mathematics, Numerical Algorithm, SIAM Journal of Mathematical Analysis, SIAM Journal on Numerical Analysis, Proceedings of A. M. S., National Science Foundation, U.S. Army Research Office, Journal of Mathematical Analysis and its Applications, American Math. Society, Department of Energy.

*Preparation Date: July 28, 2009*