LONG CHEN

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Academic Experience

- **Professor**   Jul. 2015 – present
  Department of Mathematics, University of California at Irvine, Irvine, CA

- **Associate Professor**   Jul. 2011 – Jun. 2015
  Department of Mathematics, University of California at Irvine, Irvine, CA

- **Assistant Professor**   Jul. 2007 – Jun. 2011
  Department of Mathematics, University of California at Irvine, Irvine, CA

- **Postdoctoral Fellow**   Sep. 2006 – Jun. 2007
  Department of Mathematics, University of Maryland, College Park, MD

- **Postdoctoral Fellow**   Sep. 2005 - Aug. 2006
  Department of Mathematics, University of California, San Diego, La Jolla, CA

Education

- **Ph.D. Mathematics**   Aug. 2000 - Aug. 2005
  Pennsylvania State University, University Park, PA, USA

- **M.S. Mathematics**   Sep. 1997 – Jul. 2000
  Peking University, Beijing, CHINA

- **B.S. Mathematics**   Sep. 1993 - Jul. 1997
  Nanjing University, Nanjing, CHINA

Research Funding

- NSF Grant (PI) DMS-2309785 $237,365.00   Aug 2023 - July 2026
- NSF Grant (PI) DMS-2309777 $154,781.00   June 2023 - May 2026
- NSF Grant (PI) DMS-2012465 $249,999.00.   Aug 2020 - July 2024
- NSF Grant (co-PI) DMS-1913080 $153,626.00.   July 2019 - June 2022
- NSF grant (PI) DMS-1418934 $204,996.00   Aug 2014 - July 2018
- NSF grant (PI) DMS-1115961 $179,927.00.   Oct 2011 - Sept 2014
- U.S. DOE grant DE-SC0006903. Subaward No. 4495-UCI-DOE-6903
  $84,196.00.   Sept 2011 - Aug 2014
- NSF grant (PI) DMS-0811272 $149,999.00.   Sept 2008 - Aug 2011

Research Interest

- Numerical Methods of Partial Differential Equations
- Machine Learning and Computational Mathematics

- Finite Element Methods
- Theory and Application of Optimization Methods
- Mesh Generation and Optimization
- Software development

Editor and Referee

- **Editorial Board:**

  - Journal of Computational Mathematics. 2021 - present. (Managing editor since 2024).
  - Computers and Mathematics with Applications. 2013 - present.
  - Multiscale Modeling and Simulation. 2014 - present.
  - Advances in Computational Mathematics. 2016 - present.
  - Advances in Applied Mathematics and Mechanics. 2019 - present.

- **Referee:** Advances in Computational Mathematics, Advances in Mechanical Engineering, Applied Numerical Mathematics, Advances in Applied Mathematics and Mechanics, Applicable Analysis, Applied Mathematical Modeling, Applied Mathematics Letters, , Bulletin of Mathematical Biology, Communications in Computational Physics, Computer Methods in Applied Mechanics and Engineering, Computational and Applied Mathematics, Computers and Mathematics with Applications, Computer-Aided Design, Discrete and Continuous Dynamical System – B, ESAIM: Mathematical Modelling and Numerical Analysis, Foundations of Computational Mathematics, International Journal for Numerical Methods in Engineering, International Journal for Numerical Methods in Engineering, Journal of Computational and Applied Mathematics, Journal of Computational Chemistry, Journal of Computational Physics, Journal of Scientific Computing, Mathematics of Computation, Numerical Mathematica: Theory, Methods and Applications, Numerische Mathematik, Numerical Linear Algebra with Applications, Numerical Methods for Partial Differential Equations, SCIENCE CHINA Mathematics, SIAM Matrix Analysis and Applications, SIAM Numerical on Analysis, SIAM Scientific Computing, SIGGRAPH.

List of Publications

- **Submitted Articles**

  8. Long Chen, Zeyi Xu, Jingrong Wei, Hao Luo, Yuan Yao. Accelerated Mirror Descent Method through Variable and Operator Splitting. Submitted.2025.

  7. Zeyi Xu, Long Chen. Adaptive Accelerated Gradient Descent Methods for Convex Optimization. Submitted.2025.

  6. L. Chen, H. Luo, and J. Wei. Accelerated Gradient Methods Through Variable and Operator Splitting. Submitted.2025.

  5. L. Chen and X. Huang. Hybridizable Symmetric Stress Elements on the Barycentric Refinement in Arbitrary Dimensions. Submitted. 2025.

  4. L. Chen and X. Huang. Tangential Normal Decompositions of Finite Element Differential Forms. Submitted, 2024.

  3. L. Chen, X. Huang, E.J. Park, and R. Wang. A Primal Staggered Discontinuous Galerkin Method on Polytopal Meshes. Submitted, 2024.

  2. S. Cao, L. Chen, and S. Lee. Edge-averaged virtual element methods for convection-diffusion and convection-dominated problems. Submitted, 2024.

  1. L. Chen, R. Guo, and J. Wei. Transformed Primal-Dual Methods with Variable-Preconditioners. Submitted. 2024.

- **Published or Accepted Journal Articles**

  75. L. Chen, X. Huang, and C. Zhang. Distributional Finite Element curl div Complexes and Application to Quad Curl Problems. *SIAM Journal on Numerical Analysis*. 2025.

74. L. Chen and X. Huang. Complexes from Complexes: Finite Element Complexes in Three Dimensions. *Mathematics of Computation*, 2025.

73. L. Chen and X. Huang. H(div)-conforming Finite Element Tensors with Constraints. *Results in Applied Mathematics*. 23 (2024) 100494.
   DOI   https://doi.org/10.1016/j.rinam.2024.100494

72. C.Y. Chen, L. Chen, X.H. Huang, and H.Y. Wei. Geometric Decomposition and Efficient Implementation of High Order Face and Edge Elements. *Communications in Computational Physics*. Vol. 35, No. 4, pp. 1045-1072. 2024.
   DOT   https://doi.org/10.4208/cicp.OA-2023-0249

71. L. Chen , X. Huang . Finite element complexes in two dimensions (in Chinese). *Sci Sin Math*, 2024, 54: 1–34,

70. L. Chen and X. Huang. A New Div-Div-Conforming Symmetric Tensor Finite Element Space with Applications to the Biharmonic Equation. *Mathematics of Computation*. 94 (2025), 33-72
   DOI   https://doi.org/10.1090/mcom/3957

69. L. Chen, R. Guo, and J. Zou. A Family of Immersed Finite Element Spaces and Applications to Three Dimensional H(Curl) Interface Problems. *SIAM Journal on Scientific Computing*. Vol. 45(6), 2023.
   DOI   https://doi.org/10.1137/22M1505360

68. L. Chen and X. Huang. Finite Element de Rham and Stokes Complexes in Three Dimensions. *Mathematics of Computation*, 93:55-110, 2024.
   DOI   https://doi.org/10.1090/mcom/3859

67. Y. Xie, S. Cao, L. Chen, and L. Zhong. Convergence and Optimality of an adaptive modified weak Galerkin finite element method. *Numerical Methods for Partial Differential Equations*, 39(5):3847-3873, 2023.
   DOI   https://doi.org/10.1002/num.23027

66. L. Chen and J. Wei. Transformed Primal-Dual Methods for Nonlinear Saddle Point Systems. *Journal of Numerical Mathematics*. 31(4), 281-311, 2023.
   DOI   https://doi.org/10.1515/jnma-2022-0056

65. S. Cao, L. Chen, and R. Guo. Immersed Virtual Element Methods for Electromagnetic Interface Problems in Three Dimensions. *Mathematical Models and Methods in Applied Sciences*, 33(03): 455–503, 2023.
   DOI   https://doi.org/10.1142/S0218202523500112

64. S. Cao, L. Chen, R. Guo, and F. Lin. Immersed Virtual Element Methods for Elliptic Interface Problems in Two Dimensions. *Journal of Scientific Computing*, 93 (12), 2022.
   DOI   https://doi.org/10.1007/s10915-022-01949-x

63. L. Chen and X. Huang. Finite elements for div and divdiv conforming symmetric tensors in arbitrary dimensions. *SIAM Journal on Numerical Analysis,* 60: 1932–1961, 2022.
   DOI   https://doi.org/10.1137/21M1433708

62. D. Wang, B. Zheng, L. Chen, G. Lin and J. Xu. Block Triangular Preconditioning for Stochastic Galerkin Method. *Journal of Computational and Applied Mathematics.* 412,114298, 2022.
   DOI   https://doi.org/10.1016/j.cam.2022.114298

61. L. Chen and X. Huang. A finite elements elasticity complex in three dimensions. *Mathematics of Computation*, 91, 2095–2127, 2022.
   DOI   https://doi.org/10.1090/mcom/3739

60. S. Cao, L. Chen, and X. Huang. Error analysis of a decoupled finite element method for quad-curl problems. *Journal of Scientific Computing*, 90(29) 2022.
   DOI   https://doi.org/10.1007/s10915-021-01705-7

59. S. Cao, L. Chen, and R. Guo. A Virtual Finite Element Method for Two Dimensional Maxwell Interface Problems with a Background Unfitted Mesh. *Mathematical Models and Methods in Applied Sciences*, vol. 31(14), 2907–2936, 2021.
    DOI   https://doi.org/10.1142/S0218202521500652

58. H. Luo and L. Chen. From Differential Equation Solvers to Accelerated First-Order Methods for Convex Optimization. *Mathematical Programming*. 195, 735–781, 2021.
    DOI   https://doi.org/10.1007/s10107-021-01713-3

57. L. Chen and X. Huang. Finite elements for divdiv-conforming symmetric tensors in three dimensions. *Mathematics of Computation*, 91, 1107–1142, 2021.
    DOI   https://doi.org/10.1090/mcom/3700

56. L. Chen, X. Hu, and S. Wise. Convergence Analysis of the Fast Subspace Descent Methods for Convex Optimization Problems. *Mathematics of Computation.* 2249-2282, 89, 2020.
    DOI   https://doi.org/10.1090/mcom/3526

55. L. Chen and X. Huang. Nonconforming Virtual Element Method for 2m-th Order Partial Differential Equations in $\mathbb{R}^n$. *Mathematics of Computation*, 89, 1711-1744, 2020.
    DOI   https://doi.org/10.1090/mcom/3498

54. S. Cao and L. Chen. Anisotropic Error Estimates of the Linear Nonconforming Virtual Element Methods. *SIAM Journal on Numerical Analysis.* 57(3), 1058–1081, 2019.
    DOI   https://doi.org/10.1137/18M1196455

53. G. Wang, F. Wang, L. Chen, and Y. He. A Divergence Free Weak Virtual Element Method for the Stokes-Darcy Problem on General Meshes. *Computer Methods in Applied Mechanics and Engineering*. 344: 998–1020, 2019.
    DOI   https://doi.org/10.1016/j.cma.2018.10.022

52. L. Chen and F. Wang. A Divergence Free Weak Virtual Element Method for the Stokes Problem on Polyhedral Meshes. *Journal of Scientific Computing*. 78, 864–886, 2019.
    DOI   https://doi.org/10.1007/s10915-018-0796-5

51. L. Chen and X. Huang. Decoupling of Mixed Methods Based on Generalized Helmholtz Decompositions. *SIAM Journal on Numerical Analysis*. 56(5):2796–2825, Jan. 2018.
    DOI   https://doi.org/10.1137/17M1145872

50. S. Cao and L. Chen. Anisotropic Error Estimates of the Linear Virtual Element Method on Polygonal Meshes. *SIAM Journal on Numerical Analysis*. 56(5):2913-2939, 2018.
    DOI   https://doi.org/10.1137/17M1154369

49. L. Chen, J. Hu, X. Huang. Multigrid Methods for Hellan-Herrmann-Jonson Mixed Method of Kirchhoff Plate Bending Problems. *Journal of Scientific Computing*, 76: 673–696, 2018.
    DOI   https://doi.org/10.1007/s10915-017-0636-z

48. L. Chen and J. Huang. Some Error Analysis on Virtual Element Methods. *Calcolo*. 55:5,2018.
    DOI   https://doi.org/10.1007/s10092-018-0249-4

47. L. Chen, J. Hu, X. Huang, and H. Man. Residual-Based A Posteriori Error Estimates for Symmetric Conforming Mixed Finite Elements for Linear Elasticity Problems. *Science China Mathematics*. 61:973–992, 2018.
    DOI   https://doi.org/10.1007/s11425-017-9181-2

46. L. Chen, Y. Wu, L. Zhong, and J. Zhou. MultiGrid Preconditioners for Mixed Finite Element Methods of the Vector Laplacian. Journal of Scientific Computing, 77(1):101–128, Oct. 2018.
    DOI   https://doi.org/10.1007/s10915-018-0697-7

45. L. Chen and Y. Wu. Convergence of Adaptive Mixed Finite Element Methods for Hodge Laplacian Equation without harmonic forms. *SIAM Journal on Numerical Analysis*. 55(6), 2905–2929, 2017.
    DOI   https://doi.org/10.1137/16M1097912

44. J. Huang, L. Chen and H. Rui. Multigrid Methods for A Mixed Finite Element Method of The Darcy-Forchheimer Model. *Journal of Scientific Computing*, 74(1), 396–411, 2018.
    DOI   https://doi.org/10.1007/s10915-017-0466-z

43. L. Chen, J. Hu, X. Huang. Fast Auxiliary Space Preconditioner for Linear Elasticity in Mixed Form. *Mathematics of Computation*. 87(312):1601–1633, 2018.
    DOI   https://doi.org/10.1090/mcom/3285

42. L. Chen, H. Wei, M. Wen. An Interface-Fitted Mesh Generator and Virtual Element Methods for Elliptic Interface Problems. *Journal of Computational Physics*. 334(1), 2017, 327–348.
    DOI   http://dx.doi.org/10.1016/j.jcp.2017.01.004

41. L. Chen, J. Hu, X. Huang. Stabilized mixed finite element methods for linear elasticity on simplicial grids in $\mathbb{R}^n$. *Comput. Methods Appl. Math.* 2016.
    DOI   https://doi.org/10.1515/cmam-2016-0035

40. B. Zheng, L.P. Chen, X. Hu, L. Chen, R.H. Nochetto, J. Xu. Fast multilevel solvers for a class of discrete fourth order parabolic problems. *Journal of Scientific Computing*, 69(1), 201-226, 2016.
    DOI   http://dx.doi.org/10.1007/s10915-016-0189-6

39. W. Wang, L. Chen, and J. Zhou. Postprocessing mixed finite element methods for solving Cahn-Hilliard equation: Methods and Error Analysis. *Journal of Scientific Computing*, 67(2), 724-746, 2016.
    DOI   http://dx.doi.org/10.1007/s10915-015-0101-9

38. L. Chen, R.H. Nochetto, E. Otarola, A.J. Salgado. Multilevel Methods For Nonuniformly Elliptic Operators and Fractional Diffusion. *Mathematics of Computation.* 85 (302), 2583-2607, 2016.
    DOI   http://dx.doi.org/10.1090/mcom/3089

37. L. Chen. Multi-Grid Methods for Saddle Point Systems using Constrained Smoothers. *Computers and Mathematics with Applications*, 70(12) 2854 – 2866, 2015.
    DOI   http://dx.doi.org/10.1016/j.camwa.2015.09.020

36. P. Zu, L. Chen, and J. Xin. A Computational Study of Residual KPP Front Speeds in Time-Periodic Cellular Flows in the Small Diffusion Limit. *Physica D: Nonlinear Phenomena*, 311, 37 - 44, 2015.
    DOI   http://dx.doi.org/10.1016/j.physd.2015.07.001

35. L. Chen, J. Wang, Y. Wang and X. Ye. Au Auxiliary Space Multigrid Preconditioner for the Weak Galerkin Method. *Computers and Mathematics with Applications*, 70(4):330–344 2015.
    DOI   http://dx.doi.org/10.1016/j.camwa.2015.04.016

34. L. Chen, R.H. Nochetto, E. Otarola, A.J. Salgado. A PDE approach to fractional diffusion: a posteriori error analysis. *Journal of Computational Physics*, 293, 339-358, 2015.
    DOI   http://dx.doi.org/10.1016/j.jcp.2015.01.001

33. L. Chen, X. Hu, M. Wang, and J. Xu. A Multigrid Solver based on Distributive Smoother and Defect Correction for Oseen Problems. *Numerical Mathematics: Theory, Methods and Applications*, 8(2), 237-252, 2015.
    DOI   http://dx.doi.org/10.4208/nmtma.2015.w09si.

32. L. Chen. A simple construction of a Fortin operator for the two dimensional Taylor-Hood element. *Computers and Mathematics with Applications*, 68(10),1368–1373, 2014.
    DOI   http://dx.doi.org/10.1016/j.camwa.2014.09.003.

31. J. Zhou, L. Chen, Y. Huang and W. Wang. An Efficient Two-Grid Scheme for the Cahn-Hillard Equation. *Communications in Computational Physics*, 17(01), 127-145, 2015. DOI http://dx.doi.org/10.4208/cicp.231213.100714a.

30. L. Chen, M. Wang, and L. Zhong. Convergence Analysis of The Triangular MAC Scheme for Stokes Equations. *Journal of Scientific Computing*, 63(3), 716-744, 2015.
   DOI   http://dx.doi.org/10.1007/s10915-014-9916-z.

29. J. Hateley, H. Wei and L. Chen. Fast Methods for Computing Centroidal Voronoi Tessellations. *Journal of Scientific Computing*, 2014.
   DOI   http://dx.doi.org/10.1007/s10915-014-9894-1.

28. J. Zhou, X. Hu, L. Zhong, S. Shu, and L. Chen. Two-Grid Methods for Maxwell Eigenvalue Problems. *SIAM Journal on Numerical Analysis*, 52(4), 2027–2047, 2014.

27. H. Wei, L. Chen, Y. Huang and B. Zheng. Adaptive Mesh Refinement and Superconvergence for Two Dimensional Interface Problems. *SIAM Journal on Scientific Computing*, 36(4), A1478–A1499, 2014.

26. L. Chen, J. Wang and X. Ye. A posteriori error estimates for Weak Galerkin finite element methods for second order elliptic problems. *Journal of Scientific Computing*, 59(2), 496-511, 2014.

25. Y. Wu, X. Xie, and L. Chen. Hybrid Stress Finite Volume Method for Linear Elasticity Problems. *International Journal of Numerical Analysis and Modeling*, 10(3), 634–656, 2013.

24. L. Chen and M. Wang. Cell conservative flux recovery and a posteriori error estimate of vertex-centered finite volume methods. *Advances in Applied Mathematics and Mechanics*, 5 (5), 705-727. 2013.

23. M. Wang and L. Chen. Multigrid Methods for the Stokes equations using Distributive Gauss-Seidel Relaxations based on the Least Squares Commutator. *Journal of Scientific Computing*. 56(2): 409-431, 2013.
   DOI   http://10.1007/s10915-013-9684-1

22. L. Chen, M.J. Holst, J. Xu, and Y. Zhu. Local Multilevel Preconditioners for Elliptic Equations with Jump Coefficients on Bisection Grids. *Computing and Visualization in Science*, 15(5), 271–289, 2012.

21. W.C. Lo, L. Chen, M. Wang and Q. Nie. A Robust and Efficient Method for Steady State Patterns in Reaction-Diffusion Systems. *Journal of Computational Physics*, 231(15), 5062-5077, 2012.

20. Y. Wu, L. Chen, X. Xie, and J. Xu. Convergence Analysis of V-Cycle Multigrid Methods for Anisotropic Elliptic Equations. *IMA Journal of Numerical Analysis* 32(4):1329–1347, 2012.
   DOI   http://dx.doi.org/10.1093/imanum/drr0430.

19. L. Zhong, L. Chen, S. Shu, G. Wittum, and J. Xu. Quasi-optimal convergence of adaptive edge finite element methods for three dimensional indefinite time-harmonic Maxwell's equations. *Mathematics of Computation*. 81(278):623-642, 2012.

18. L. Chen, R.H. Nochetto and J. Xu. Optimal Multilevel Methods for Graded Bisection Grids. *Numerische Mathematik*. 120(1): 1– 34, 2011.

17. L. Chen and M.J. Holst. Efficient Mesh Optimization Schemes based on Optimal Delaunay Triangulations. *Computer Methods in Applied Mechanics and Engineering*, 200, 967–984, 2011.

16. H. Wei, L. Chen and Y. Huang. Superconvergence and Gradient Recovery of Linear Finite Elements for the Laplace-Beltrami Operator on General Surfaces. *SIAM Journal on Numerical Analysis*, 48(5):1920-1943, 2010.

15. L. Chen and C-S. Zhang. A coarsening algorithm on adaptive grids by newest vertex bisection and its applications. *Journal of Computational Mathematics*. 28(6), 767-789, 2010.

14. P. Sun, L. Chen, and J. Xu. Numerical studies of adaptive finite element methods for two dimensional convection-dominated problems. *Journal of Scientific Computing*. 43(1), 24-43, 2010.

13. L. Zhong, S. Shu, L. Chen and J. Xu, Convergence of adaptive edge finite element methods for H(curl) – elliptic problems. *Numerical Linear Algebra with Applications*, 17(2–3):415–432, 2010.

12. L. Chen. A New Class of High Order Finite Volume Methods for Second Order Elliptic equations. *SIAM Journal on Numerical Analysis*, 47(6):4021–4043, 2010.

11. L. Chen and H. Li. Superconvergence of Gradient Recovery Schemes on graded meshes for corner singularities. *Journal of Computational Mathematics*. 28:11–31, 2010.

10. L. Chen, M.J. Holst, and J. Xu. Convergence and optimality of adaptive mixed finite element methods. *Mathematics of Computation*, 78: 35–53, 2009.

9. L. Chen. On minimizing the linear interpolation error of convex quadratic functions and the optimal simplex. *East Journal of Approximation*, 14(3), 271–284, 2008.

8. L. Chen, Y. Wang, and J. Wu. Stability of a streamline diffusion finite element method for turning point problems. *Journal of Computational and Applied Mathematics*, 220: 712–724, 2008.

7. L. Chen and J. Xu. Stability and accuracy of adapted finite element methods for singularly perturbed problems. *Numerische Mathematik*, 109(2): 167–191, 2008.

6. L. Chen, M.J. Holst, and J. Xu. The Finite Element Approximation of the Nonlinear Poisson-Boltzmann Equation. *SIAM Journal on Numerical Analysis*, 45(6): 2298–2320, 2007.

5. L. Chen, P. Sun, and J. Xu. Optimal anisotropic simplicial meshes for minimizing interpolation errors in L^p-norm. *Mathematics of Computation*, 76(257):179-204, 2007.

4. J. Jiang, S. Shu, Y. Huang, and L. Chen. A Mesh Adaptive Mesh Method for Two Dimensional Heat Conduction Equations with Three Temperatures. *Chinese Journal of Computational Physics*, 24(1):19-28, 2007.

3. L. Chen. Superconvergence of tetrahedral linear finite elements. *International Journal of Numerical Analysis and Modeling*, 3(3):273–282, 2006.

2. L. Chen. New analysis of the sphere covering problems and optimal polytope approximation of convex bodies. *Journal of Approximation Theory*, 133(1):134–145, 2005.

1. L. Chen and J. Xu. Optimal Delaunay triangulations. *Journal of Computational Mathematics*, 22(2):299–308, 2004.

- **Conference Proceedings**

11. J. Wei and L. Chen. Accelerated Over-Relaxation Heavy-Ball Method: Achieving Global Accelerated Convergence with Broad Generalization. *ICLR*, 2025.

10. R. Guo, S. Cao, and L. Chen. Transformer Meets Boundary Value Inverse Problem. *ICLR*. 2023.

9. S. Kia, J. Wei, and L. Chen. Distributed Optimal Resource Allocation Using Transformed Primal-Dual Method. *2023 American Control Conference (ACC)*.

8. T.M. Nguyen, V. Suliafu, S.J. Osher, L. Chen, and B. Wang. FMMformer: Efficient and Flexible Transformer via Decomposed Near-field and Far-field Attention. *NeurIPS*. 2021.

7. C. Bacuta, L. Chen and J. Xu. *Equidistribution and optimal approximation class.* Domain Decomposition Methods in Science and Engineering XX. Lecture Notes in Computational Science and Engineering Volume 91, 3-14, 2013.

6. L. Chen. *Deriving the X-Z Identity from Auxiliary Space Method.* Domain Decomposition Methods in Science and Engineering XIX, 309-316, 2010.

5. L. Chen, R.H. Nochetto and C-S. Zhang. *Multigrid Methods for Elliptic Obstacle Problems on 2D Bisection Grids*. Domain Decomposition Methods in Science and Engineering XIX, 229-236, 2010.

4. L. Chen. *Short implementation of bisection in MATLAB*, in Recent Advances in Computational Sciences – Selected Papers from the International Workshop on Computational Sciences and Its Education, P. Jorgensen, X. Shen, C.-W. Shu, and N. Yan, eds., 2008, pp. 318 – 332.

3. L. Chen and J. Xu. An optimal streamline diffusion finite element method for a singularly perturbed problem. *In AMS Contemporary Mathematics Series: Recent Advances in Adaptive Computation*, volume 383, pages 236–246, Hangzhou, 2005.

2. L. Chen, P. Sun, and J. Xu. Multilevel homotopic adaptive finite element methods for convection dominated problems. In *The Proceedings for 15th Conferences for Domain Decomposition Methods*, Lecture Notes in Computational Science and Engineering 40, pages 459–468. Springer, 2004.

1. L. Chen. Mesh smoothing schemes based on optimal Delaunay triangulations. *In 13th International Meshing Roundtable*, pages 109–120, Williamsburg, VA, 2004. Sandia National Laboratories.

- **Articles in books and monographs**

3. L. Chen and X. Huang. Discrete Hessian complexes in three dimensions. In Antonietti, P.F., Beirão da Veiga, L., Manzini, G. (eds) "*The Virtual Element Method ad its Applications*". SEMA-SIMAI Springer series. vol 31. 93–135, 2022.
   DOI   https://doi.org/10.1007/978-3-030-95319-5_3

2. J. Xu, L. Chen, and R.H. Nochetto. *Optimal Multilevel Methods for $H(\mathrm{grad})$, $H(\mathrm{curl})$, and $H(\mathrm{div})$ Systems on Graded and Unstructured Grids*. Ronald A. DeVore, Angela Kunoth (Eds.), Springer, September 2009.

1. L. Chen and J. Xu. *Topics on adaptive finite element methods*. in Adaptive Computations: Theory and Algorithms, T. Tang and J. Xu, eds., Science Press, Beijing, 2007, pp. 1–31.

- **Others**

3. L. Chen. *i*FEM: an integrated finite element methods package in MATLAB, Technical Report, University of California at Irvine. 2008.

2. L. Chen and C-S. Zhang. AFEM@matlab: a MATLAB package of Adaptive Finite Element Methods. *Technical Report. University of Maryland*. 2006.

1. L. Chen. *Robust and Accurate Algorithms for Solving Anisotropic Singularities*. PhD thesis, Department of Mathematics, The Pennsylvania State University, 2005.

Students

- **Ph.D students in UCI**

    - Lin Zhong. UCI. Graduated. 2015 Dec.
    - Penghe Zu. (Joint with Jack Xin) UCI.
    - Dongwu Wang. UCI. Graduated. 2018 Sep.
    - Min Wen. UCI. Graduated. 2018 Dec.
    - Huiwen Wu. UCI. Graduated. 2019.
    - Frank Lin. UCI. Graduated. 2021.
    - Seulip Lee. UCI. Graduated. 2021.
    - Jingrong Wei. UCI. Graduated 2024.
    - Zeyi Xu. UCI. Expected. 2027.

- **Visiting students**

    - Ming Wang. 9/2010 - 8/2012. Peking University.
    - Huayi Wei. 1/2011 - 12/2011. Xiangtan University.
    - Jie Zhou. 9/2012 - 8/2013. Xiangtan University.
    - Jian Huang. 9/2014-8/2015. Shandong University.
    - Zhaoqi Zhou. 10/2016 - 10/2017. Chinese Academy of Science.
    - Gang Wang. 10/2016 - 10/2017. Xi'an Jiaotong University.
    - Qian Zhang. 9/2017 - 3/2018. Beijing University of Technology.
    - Hao Luo. 10/2018 - 9/2019. Sichuan University.
    - Yongchao Zhang. 10/2018 - 9/2019. Xi'an Jiaotong University.

Scholars

- **Postdocs in UCI**

    - Bin Zheng. 1/2008 - 6/2008. Visiting Scholar.
    - Shuhao Cao. 7/2017 - 7/2020. Visiting Assistant Professor.
    - Ruchi Guo. 8/2020 - 7/2023. Visiting Assistant Professor.

- **Visiting scholars**

    - Ying Li. 9/2013 - 8/2014. National University of Defense Technology.
    - Liuqiang Zhong. 9/2013 - 8/2014. South China Normal University.
    - Xiaoqing Xing. 9/2013 - 8/2014. South China Normal University.
    - Hongying Man. 9/2014 - 8/2015. Beijing Institute of Technology.
    - Kyoung-Sook Moon. 7/2015 - 6/2016. Gachon University.
    - James Brannick. 1/2016 - 6/2016. Pennsylvania State University.
    - Shuhao Cao. 1/2016 - 6/2016. Pennsylvania State University.
    - Yongke Wu. 2/2016 - 2/2017. University of Electronic Science and Technology of China.
    - Feng Wang. 2/2016 - 2/2017. Nanjing Normal University.

- Yanhong Bai. 7/2016-12/2016. Southwest Petroleum University.
- Qiumei Huang. 1/2017-12/2017. Beijing University of Technology.
- Zhiqiang Yu. 11/2017 - 11/2018. Changzhou College of Information Technology.
- Caixia Kou. 1/2018 - 1/2019. Beijing University of Posts and Telecommunications.
- Jikun Zhao. 9/2019 - 9/2020. Zhengzhou University.
- Fei Wang. 11/2019 - 5/2020, Xi'an Jiaotong University.
- Ruishu Wang. 9/1/2023 - 2/28/2024, Jilin University.

Conference Session Organization and Summer Schools

- Summer School on Multilevel Adaptive Finite Element Methods, Peking University, Beijing, CHINA. July 17 – 21, 2006.

- Summer School on Multilevel Adaptive Finite Element Methods, Peking University, Beijing, CHINA. June, 2007.

- Summer School on Multilevel Adaptive Finite Element Methods, Peking University, Beijing, CHINA, July 7–11, 2008.

- Summer School on Multilevel Adaptive Finite Element Methods, Peking University, Beijing, CHINA, July 13–31, 2009.

- Summer School on Multilevel Adaptive Finite Element Methods, Peking University, Beijing, CHINA, July 26–Aug 6, 2010.

- Summer School on Finite Element Methods, Kunming University of Science and Technology, Kunming, CHINA, July 12–July 16, 2010.

- Mini-symposium: Theory and Application of Adaptive and Multilevel Methods. 20-th International Conference on Domain Decomposition Methods. UC San Diego, 7-11 Feb, 2011.

- Mini-symposium: Multilevel Mesh Adaptivity and Beyond: Computational Methods for Solving Complex Systems. AMS Western Section in Las Vegas. University of Nevada at Las Vegas. Apr 30, 2011.

- Workshop on Algebraic Multigrid Methods. Kunming, China, August 2011.

- Mini-symposium: Multilevel and Adaptive Methods for Solving Complex Systems. In the Eighth International Conference on Scientific Computing and Applications. Las Vegas, Nevada, April, 2012.

- Workshop on Scientific Computing With Applications Kunming, CHINA. July 18, 2013.

- Workshop on finite element methods. Beijing Institute for Scientific and Engineering Computing (BISEC), CHINA, August 8 - 9, 2015.

- Mini-symposium: Weak Galerkin Method and Its Applications. The 8th International Congress on Industrial and Applied Mathematics (ICIAM). Beijing, CHINA, August 10 - 14, 2015.

- Peking University Summer Academic Activities on Numerical Partial Differential Equations. August 15 - 21, 2015

- 2016 Workshop on Numerical Methods for Partial Differential Equations at Peking University, Beijing, CHINA. July 19-23, 2016.

- Southern California Applied Mathematics Symposium. UC Irvine. June 3, 2017.

- 2017 Workshop on Numerical Methods for Partial Differential Equations at Peking University, Beijing, CHINA. July 24-28, 2017.

- 2017 Summer School on Numerical Methods for Partial Differential Equations. Guangzhou, CHINA. Aug 10-11, 2017

- Workshop of Scientific Computing and Applications. Kunming. July 5 - 7, 2018.

- 2018 Summer School on Numerical Methods for Partial Differential Equations. Beijing, CHINA. July 30 - Aug 15, 2018

- Mini-symposium. The International Multigrid Conference (IMG 2019). Kunming, CHINA. August 11-16, 2019.

- 11/3 – 11/5/2021　In organizing committee of Workshop on Neural Networks, Learning, and Multilevel Finite Element Methods.

- 6/19 – 6/23/2023　In organizing committee of CBMS Conference: Deep Learning and Numerical PDEs

- 8/21/2023　Session chair of ICIAM 2023

- 1/3 - 1/6, 2024　Organizing a mini-symposium in Joint Mathematics Meetings, San Francisco.

- 6/23, 2024　International Workshop on Deep Learning and Numerical Methods for PDEs, Xi'An

- 7/12, 2024　Workshop on Scientific Computing and Data Science, Hong Kong

- 3/30 -3/31, 2025　The Symposium on Mathematical Theory for the Finite Element and Deep Learning Methods, Nanjing

Presentations

- 5/9/2025　NSF Computational Mathematics Meeting, Utah

- 2/5/2025　UCSD Optimization and Data Science Seminar, San Diego

- 7/16/2024　NSF Computational Mathematics PI Meeting, Seattle

- 7/10/2024　CUHK-SZ and CUHK Joint Summer School on Scientific Computing and Machine Learning

- 7/3/2024　Summer School "Numerical Methods and Applications of Partial Differential Equations", Xiangtan University

- 6/23/2024　International Workshop on Deep Learning and Numerical Methods for PDEs, Xi'An

- 6/21/2024　Seminar, Sun Yat-sen University

- 6/19/2024　Seminar, The Chinese University of Hong Kong

- 10/19/2023　Workshop on Computational Mathematics, Hangzhou.

- 8/20/2023　10th International Congress on Industrial and Applied Mathematics. Japan.

- 7/20/2023　Shanghai University of Finance and Economics

- 7/20/2023　Fudan University, Shanghai.

- 7/14/2023   Northwestern Polytechnical University. XiAn.

- 7/11/2023   Peking University. Beijing.

- 7/10/2023   Beijing University of Technology. Beijing.

- 7/3/2023   National Center for Applied Mathematics in Chongqing Big Data Research Institute

- 6/29/2023   University of Electronic Science and Technology of China, Chengdu

- 6/26/2023   Scientific Computing: Theory and Applications. Sichuan University.

- 6/23/2023   Xiamen University

- 6/21/2023   Hong Kong University

- 6/20/2023   Hong Kong Polytechnic University

- 6/20/2023   The Chinese University of Hong Kong

- 5/16/2023   Frontiers of Numerical PDEs. Brin Mathematics Research Center. University of Maryland.

- 4/28/2023   (Online) Numerical Methods for Data Science and Engineering Seminar. Texas State University

- 3/27/2023   ACMS Colloquium. Notre Dame

- 3/6/2023   Colloquia Salientia. Portland State University.

- 1/17/2023   Math Colloquium. The University of Alabama.

- 11/2/2022   (Online) Shanghai University of Finance and Economics.

- 6/6/2022   (Online) Beijing Computational Science Research Center.

- 6/6/2022   (Online) South China Normal University - Guangzhou University

- 5/10/2022   (Online) Peking University.

- 5/3/2022   (Online) Numerical Analysis Seminar. University of Maryland

- 3/29/2022   (Online) University of Georgia Athens.

- 2/25/2022   (Online) Numerical Analysis and PDE Seminar. University of Delaware

- 1/20/2022   (Online) Tsinghua-BIMSA Seminars in Applied Mathematics. Tsinghua University

- 1/12/2022   (Online) Optimization and Data Science Seminar. UCSD

- 12/27/2021   Morgan State University

- 11/5/2021   Workshop on Neural Networks, Learning, and Multilevel Finite Element Methods.

- 9/23/2021   (Online) University of South Carolina

- 4/16/2021   (Online) Shanghai Normal University

- 3/12/2021   (Online) Emory University

- 3/6/2021   (Online) Workshop on Scientific Computing and Applications. University of Nevada, Las Vegas.

- 1/29/2021   (Online) Mathematical Sciences Colloquium, Department of Mathematical Sciences, Michigan Technological University.

- 1/10/2021   (Online) Oberwolfach Workshop on Nonstandard Finite Element Methods

- 12/29/2020   (Online) 2020 Annual meeting of International Consortium of Chinese Mathematicians, USTC, Anhui.

- 10/8/2020   (Online) Shandong University

- (Online) Workshop on Multiphysics: Mathematical Theory and Numerical Methods. Xi'an Jiaotong University, Aug 21, 2020.

- (Online) Tianyuan Mathematical Center in Northeast China, Jilin University, Changchun, July 28, 2020.

- (Online) CCMA Seminar on Mathematics of Data and Computation, Pennsylvania State University, May 14, 2020.

- The International Multigrid Conference, Kunming. Aug 13, 2019.

- Sichuan University, Chengdu. Aug 6, 2019.

- Chinese Academy of Sciences, Beijing. July 26, 2019.

- Beijing University of Technology, Beijing. July 24, 2019.

- Fudan University, Shanghai. July 19, 2019.

- Shanghai University of Finance and Economics, Shanghai. July 18, 2019.

- University of Electronic Science and Technology of China, Chengdu. July 12, 2019.

- UCSD Optimization and Data Science Seminar. Oct 10, 2018.

- CAM Seminar, University of Tennessee. Sep 19, 2018.

- Jilin University, Jilin. Aug 27, 2018.

- China West Normal University, Nanchong. Aug 21, 2018.

- Sichuan University, Chengdu. Aug 20, 2018.

- Chinese Academy of Sciences, Beijing. Aug 16, 2018.

- University of Electronic Science and Technology of China, Chengdu. July 9, 2018.

- Workshop of Scientific Computing and Applications. Kunming. July 5 - 7. 2018.

- 2017 Summer School on Numerical Methods for Partial Differential Equations. Guangzhou. Aug 10-11, 2017

- **Invite (Plenary) Speakers**. 11-th National Conference on Computational Math. XiAn. July 22, 2017

- XiAn Jiaotong University, XiAn. CHINA. July 20, 2017

- Nanjing Normal University, Nanjing. CHINA. July 3, 2017

- Sichuan University, Chengdu. CHINA. July 7, 2017.

- University of Electronic Science and Technology of China, Chengdu. June 19, 2017

- SIAM Central States Section. Little Rock, Arkansas. Sep 30, 2016.

- 9-th National Conference on Finite Element Methods. Emei, Sichuan. Aug 20, 2016.

- Shanghai Jiao Tong University, Shanghai. Aug 10-11, 2016.

- Workshop on Numerical Methods for PDE at Peking University, Beijing, Jul 20, 2016.

- Chinese Academy of Sciences, Beijing. July 5, 2016.

- MAFELAP, Brunel University London, June 14-17, 2016.

- SoCAMS. Claremont Colleges. June 4, 2016.

- Tufts University. Boston. Feb 13 - 16. 2016.

- University of California at Riverside. Riverside, CA, Feb 3, 2016.

- Chinese Academy of Sciences, Beijing, Jan 4, 2016.

- Shandong University. Jinan, Shandong. Dec 28 - 30. 2015.

- Sichuan University. Chengdu, Sichuan. Dec 18. 2015.

- Jilin University. Changchun, Jilin. Dec 7 - 9, 2015.

- Shanghai Jiaotong University. Shanghai. Dec 3-5, 2015.

- Wenzhou University. Wenzhou, Zhejiang. Nov 16 - 18, 2015.

- Xiamen University. Xiamen, Fujian. Nov 6-9, 2015.

- Numerical Methods on Polygon Meshes. Altanata. Oct 26-28, 2015.

- School of Mathematics and Computational Science, Changsha University of Science and Technology. Oct 13, 2015.

- School of Mathematics, Xiangtan University, Hunan. Oct 11, 2015.

- School of Mathematics, South China Normal University Guangzhou, CHINA. Sep 11, 2015.

- The 8th International Congress on Industrial and Applied Mathematics (ICIAM). Beijing, August 10 - 14, 2015.

- School of Mathematical Sciences. Sichuan University. CHINA, July 20, 2015.

- SIAM Conference on Computational Science. Salt Lake City, Utah. March 14 - 15, 2015.

- Numerical Analysis Seminar. Texas A&M. Feb 25, 2015.

- Finite Element Circus. Minnesota. October 24-25, 2014.

- IMA Special workshop. Minnesota. October 22-24, 2014.

- School of Mathematics and Statistics, Beijing Institute of Technology, July 10, 2014.

- Beijing Computational Science Research Center, July 8, 2014.

- Chinese Academy of Sciences, July 8, 2014.

- School of Mathematics, Sichuan University, Chengdu, Sichuan CHINA. July 2, 2014.

- School of Mathematics and Statistics, WuHan University, June 27, 2014.

- Beijing International Center for Mathematical Research (BICMR), June 26, 2014.

- ICERM Workshop. Brown University. May 12-16, 2014.

- Oberwolfach Workshop. Oberwolfach, Germany. Nov 17-22, 2013.

- Colloquium. Department of Mathematics and Statistics. Portland State University. Portland, Oregon. Oct 4. 2013.

- School of Mathematics, Sun Yat-sen University International Conference on Frontiers of Numerical PDEs. Guangzhou. Aug 2. 2013.

- School of Mathematics, Sichuan University, Chengdu, Sichuan CHINA. July 25, 2013.

- Workshop on Scientific Computing With Applications Kunming. July 18, 2013.

- South China Normal University Guangzhou. July 12, 2013.

- SIAM Annual Meeting San Diego, CA. July 10, 2013.

- Workshop on Multilevel computational methods and optimization Weizmann Institute of Science, Israel Apr 30-May 2, 2013.

- Numerical Approximation of Partial Differential Equations. In Occasion of Ricardo H. Nochetto's 60th Birthday. Gargnano del Garda, Brescia, Italy. Mar 21, 2013.

- AMS Joint Mathematics Meetings. San Diego, Jan 11, 2013.

- Numerical Analysis Seminar, University of Maryland at College Park. Dec 11, 2012.

- Department of Mathematics and Statistics. Missouri University of Science and Technology. Oct 12, 2012.

- Workshop on Efficient Numerical Methods for Partial Differential Equations. Urumqi. August 13-18, 2012.

- Eighth International Conference on Scientific Computing and Applications. University of Nevada at Las Vegas, Nevada, Apr 1 - 4, 2012.

- Frontiers of Computational and Applied Mathematics. Beijing International Center for Mathematical Research. Oct 21 - Oct 25, 2011.

- Department of Mathematics, Hong Kong Baptist University. Aug 30, 2011.

- School of Mathematical Science. Peking University. Beijing. CHINA. Aug 15 - 20, 2011.

- Short Course/Workshop on (Algebraic) Multigrid Methods Kunming. Aug 1 - 10, 2011.

- 2011 Sun Yat-sen University International Conference on Frontiers of Numerical PDEs. Guangzhou. Aug 1-4. 2011.

- AMS Western Section in Las Vegas. University of Nevada at Las Vegas. Apr 30, 2011.

- Department of Applied Mathematics. Illinois Institute of Technology Chicago, 25 Apr, 2011.

- **Invite (Plenary) Speakers** of 20-th International Conference on Domain Decomposition Methods. UC San Diego, 7-11 Feb, 2011.

- Changjiang International Conference on Mathematics. Sichuan. CHINA, Aug 9, 2010.

- Summer School on Multilevel Adaptive Finite Element Methods, Beijing, July 26–Aug 6, 2010.

- Summer School on Finite Element Methods, Kunming University of Science and Technology, Kunming, July 12–July 16, 2010.

- School of Mathematical Sciences. Sichuan University. CHINA, July 6, 2010.

- Midwest Numerical Analysis Day, Iowa State University, Ames, Iowa. April 24-25, 2010

- Scientific Computing Seminars. University of Houston, April 8, 2010.

- Adaptive and Multilevel Methods for Partial Differential Equations. University of California at San Diego in La Jolla, California. November 13-14, 2009.

- 19-th International Conference on Domain Decomposition Methods, Zhangjiajie, August 18, 2009.

- Summer School on Multilevel Adaptive Finite Element Methods, Beijing, July 13–31, 2009.

- International Conference on Applied Analysis and Scientific Computation Shanghai Normal University, June 26, 2009.

- Nanjing University, June 23, 2009.

- Chinese Academy of Sciences, June 9, 2009.

- 14-th Copper Mountain Conference on Multigrid Methods, March 25, 2009.

- Mathematical Sciences Seminars, University of Nevada at Las Vegas, March 11, 2009.

- SIAM Conference on Computational Science and Engineering (CSE09), Miami, March 4, 2009.

- Computational and Applied Mathematics Seminar, Purdue University, November 21, 2008.

- Department of Mathematics Colloquium, Wayne State University, November 3, 2008.

- Finite Element Circus, Rensselaer Polytechnic Institute, October 25, 2008.

- Chinese Academy of Sciences, July 7, 2008.

- Summer School on AFEM and Multigrid, Beijing, July 7–11, 2008.

- Foundation of Computational Mathematics, Hong Kong, June 20, 2008.

- Mathematical Sciences Seminars and Colloquium, University of Nevada at Las Vegas, May 6, 2008.

- Applied Math Seminar, University of California, Irvine, April 21, 2008.

- Xiangtan University, March 25, 2008.

- Graduate Seminar, University of California, Irvine, November 16, 2007.

- 10th SIAM conference on Geometric Design and Computing, San Antonio, Texas, November 4, 2007.

- Summer School on AFEM and Multigrid, Beijing, June, 2007.

- Mathematical and Computational Sciences Division Seminar Series, National Institute of Standards and Technology (NIST), June 5, 2007.

- NSF-CBMS Regional Research Conference, University of Iowa, May 23, 2007.

- Finite Element Circus, University of Maryland, April 21, 2007.

- Numerical Analysis Seminar, University of Maryland, January 30, 2007.

- University of California, Irvine (Special Recruitment Colloquium), January 19, 2007.

- Finite Element Circus, The Pennsylvania State University, November 4, 2006.

- Academy of Mathematics and System Sciences, Chinese Academy of Sciences. July 21, 2006.

- 2006 Summer School on the Multiscale Adaptive Method, Beijing University, July 17 – 21, 2006.

- Numerical Analysis Seminar, UCSD, May 23, 2006.

- Tech Report, National Biomedical Computation Resource, UCSD, Apr. 27, 2006

- Numerical Analysis Seminar, UCSD, Oct. 11, 2005.

- 8th US National Congress on Computational Mechanics Austin, Texas, July 24-28, 2005

- Midwest Numerical Analysis Conference, May 22, 2005

- University of California, San Diego (Special Recruitment Colloquium), Jan 6, 2005

- University of Delaware, Dec 13, 2004

- Wayne State University, Dec 8, 2004

- University of Maryland, Nov 30, 2004

- Finite Element Circus. Syracuse University, Oct 15, 2004

- CAM Luncheon Seminar in Penn State, Sep 24, 2004

- 13th International Meshing Roundtable. Williamsburg, VA. Sep. 20 2004

- Peking University, June 21, 2004

- Superconvergence and A Posteriori Error Estimates, Changsha, May 31-Jun 2, 2004

- Recent Advances in Adaptive Computation, Hangzhou, May 24-28, 2004

- Finite Element Circus, University of Pittsburgh, April 17 2004

- Finite Element Circus. Cornell University, Nov 8, 2003

- CAM Luncheon Seminar in Penn State, Nov 14, 2003