

# Curriculum Vitae

## YONGTAO ZHANG

Professor

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### Education

- Ph.D. in Applied Mathematics, May 2003.  
Division of Applied Mathematics, Brown University, USA  
**Thesis:** *Topics in structured and unstructured Weighted ENO schemes.*  
**Advisor:** Professor Chi-Wang Shu
- M.Sc. in Computational Mathematics, June 1999.  
School of Mathematical Sciences, Nankai University, China
- B.Sc. in Computational Mathematics, June 1996.  
School of Mathematical Sciences, Nankai University, China

### Professional Appointments

- Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, USA, July 2017 – Present.
- Associate Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, USA, July 2011 – June 2017.
- Director of Undergraduate Studies, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, USA, July 2012 – June 2016.
- Assistant Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, USA, July 2010 – June 2011.
- Assistant Professor, Department of Mathematics, University of Notre Dame, USA, July 2006 – June 2010.
- Visiting Assistant Professor, Department of Mathematics, University of California, Irvine, USA, July 2003 – June 2006.

### Editorship

- Editorial Board Member / Associate Editor, **Journal of Scientific Computing**. Jan 2014 – Present.
- Associate Editor, **Communications on Applied Mathematics and Computation**. Jan 2019 – Present.

- Associate Editor, **Frontiers in Applied Mathematics and Statistics** (Numerical Analysis and Scientific Computation section). Jan 2023 – Present.
- Editorial Board Member, **Mathematics** (Computational and Applied Mathematics Section). Jan 2023 – Present.
- Guest Editor, **Pure and Applied Mathematics Quarterly**. 2016 – 2018.

## Publications

- Edited Special Issues of Journals

- [1] Pure and Applied Mathematics Quarterly, Special issue in honor of Professor Chi-Wang Shu. Editors: Jian-Guo Liu, Yong-Tao Zhang. International Press of Boston, Inc., volume 14, number 1, 2018.  
<https://www.intlpress.com/site/pub/pages/journals/items/pamq/content/vols/0014/0001/index.php>
- [2] Communications on Applied Mathematics and Computation, the Focused Issue on WENO Schemes. Editors: Sigal Gottlieb, Jan S. Hesthaven, Jianxian Qiu, Chi-Wang Shu, Qiang Zhang, Yong-Tao Zhang. Springer Nature, volume 5, issue 1, 2023.  
<https://link.springer.com/journal/42967/volumes-and-issues/5-1>
- [3] Communications on Applied Mathematics and Computation, the Focused Issue in memory of Professor Ching-Shan Chou. Editors: Qing Nie, Chi-Wang Shu, Yulong Xing, Yong-Tao Zhang. Springer Nature, volume 6, issue 1, 2024.

- Refereed Journal Articles

- [1] Y.-T. Zhang and C. Sun, *Two notes on Petrov-Galerkin methods*, **Acta Sci. Nat. Univ. Nankai**, v33, no. 1, (2000), pp. 88-93. (in Chinese, English Summary)
- [2] Y.-T. Zhang and C.-W. Shu, *High order WENO schemes for Hamilton-Jacobi equations on triangular meshes*, **SIAM Journal on Scientific Computing**, v24 (2003), pp. 1005-1030.
- [3] Y.-T. Zhang, J. Shi, C.-W. Shu and Y. Zhou, *Numerical viscosity and resolution of high-order weighted essentially nonoscillatory schemes for compressible flows with high Reynolds numbers*, **Physical Review E**, v68 (2003), article number 046709, pp. 1-16.
- [4] J. Shi, Y.-T. Zhang and C.-W. Shu, *Resolution of high order WENO schemes for complicated flow structures*, **Journal of Computational Physics**, v186 (2003), pp. 690-696.
- [5] C.M. Mizutani, Q. Nie, F. Wan, Y.-T. Zhang, P. Vilmos, R. Sousa-Neves, E. Bier, J.L. Marsh and A.D. Lander, *Formation of the BMP activity gradient in the Drosophila embryo*, **Developmental Cell**, v8, no. 6, (2005), pp. 915-924.
- [6] S. Zhang, Y.-T. Zhang and C.-W. Shu, *Multistage interaction of a shock wave and a strong vortex*, **Physics of Fluids**, v17 (2005), article number 116101, pp. 1-13.
- [7] Y.-T. Zhang, H.-K. Zhao and J. Qian, *High order fast sweeping methods for static Hamilton-Jacobi equations*, **Journal of Scientific Computing**, v29, (2006), pp. 25-56. DOI: 10.1007/s10915-005-9014-3.
- [8] Q. Nie, Y.-T. Zhang and R. Zhao, *Efficient semi-implicit schemes for stiff systems*, **Journal of Computational Physics**, v214 (2006), pp. 521-537.

- [9] Y.-T. Zhang, C.-W. Shu and Y. Zhou, *Effects of shock waves on Rayleigh-Taylor instability*, **Physics of Plasmas**, v13 (2006), article number 062705.
- [10] D. Levy, S. Nayak, C.-W. Shu and Y.-T. Zhang, *Central WENO schemes for Hamilton-Jacobi equations on triangular meshes*, **SIAM Journal on Scientific Computing**, v28, (2006), pp. 2229-2247.
- [11] S. Zhang, Y.-T. Zhang and C.-W. Shu, *Interaction of an oblique shock wave with a pair of parallel vortices: shock dynamics and mechanism of sound generation*, **Physics of Fluids**, v18, (2006), article number 126101.
- [12] Y.-T. Zhang, H.-K. Zhao and S. Chen, *Fixed-point iterative sweeping methods for static Hamilton-Jacobi equations*, **Methods and Applications of Analysis**, v13, (2006), pp. 299-320.
- [13] J. Qian, Y.-T. Zhang and H.-K. Zhao, *Fast sweeping methods for Eikonal equations on triangular meshes*, **SIAM Journal on Numerical Analysis**, v45, (2007), pp. 83-107.
- [14] J. Qian, Y.-T. Zhang and H.-K. Zhao, *A fast sweeping method for static convex Hamilton-Jacobi equations*, **Journal of Scientific Computing**, v31, (2007), pp. 237-271.
- [15] C.-S. Chou, Y.-T. Zhang, R. Zhao and Q. Nie, *Numerical methods for stiff reaction-diffusion systems*, **Discrete and Continuous Dynamical Systems - Series B**, v7, (2007), pp. 515-525.
- [16] Y.-T. Zhang, A. Lander and Q. Nie, *Computational analysis of BMP gradients in dorsal-ventral patterning of the zebrafish embryo*, **Journal of Theoretical Biology**, v248, (2007), pp. 579-589.
- [17] M. Alber, T. Glimm, H.G.E. Hentschel, B. Kazmierczak, Y.-T. Zhang, J. Zhu and S.A. Newman, *The morphostatic limit for a model of skeletal pattern formation in the vertebrate limb*, **Bulletin of Mathematical Biology**, v70, (2008), pp. 460-483.
- [18] Q. Nie, F. Wan, Y.-T. Zhang and X.-F. Liu, *Compact integration factor methods in high spatial dimensions*, **Journal of Computational Physics**, v227, (2008), pp. 5238-5255.
- [19] F. Li, C.-W. Shu, Y.-T. Zhang and H.-K. Zhao, *A second order discontinuous Galerkin fast sweeping method for Eikonal equations*, **Journal of Computational Physics**, v227, (2008), pp. 8191-8208.
- [20] Y.-T. Zhang and C.-W. Shu, *Third order WENO scheme on three dimensional tetrahedral meshes*, **Communications in Computational Physics**, v5, (2009), pp. 836-848.
- [21] J. Zhu, Y.-T. Zhang, S.A. Newman and M. Alber, *Application of Discontinuous Galerkin Methods for reaction-diffusion systems in developmental biology*, **Journal of Scientific Computing**, v40, (2009), pp. 391-418.
- [22] A. Lander, Q. Nie, F. Wan and Y.-T. Zhang, *Localized ectopic expression of Dpp receptors in a Drosophila embryo*, **Studies in Applied Mathematics**, v123, issue 2, (2009), pp. 175-214.
- [23] J. Zhu, Y.-T. Zhang, S.A. Newman and M.S. Alber, *A finite element model based on discontinuous Galerkin methods on moving grids for vertebrate limb pattern formation*, **Mathematical Modelling of Natural Phenomena**, v4, no. 4, (2009), pp. 131-148.
- [24] S. Zhang, S. Jiang, Y.-T. Zhang and C.-W. Shu, *The mechanism of sound generation in the interaction between a shock wave and two counter-rotating vortices*, **Physics of Fluids**, v21, (2009), article number 076101.

- [25] T. Xiong, M. Zhang, Y.-T. Zhang and C.-W. Shu, *Fast sweeping fifth order WENO scheme for static Hamilton-Jacobi equations with accurate boundary treatment*, **Journal of Scientific Computing**, v45, (2010), pp. 514-536. DOI: 10.1007/s10915-010-9345-6
- [26] J. Zhu, Y.-T. Zhang, M. S. Alber and S. A. Newman, *Bare bones pattern formation: a core regulatory network in varying geometries reproduces major features of vertebrate limb development and evolution*, **PLoS ONE**, v5(5): e10892, (2010).  
doi:10.1371/journal.pone.0010892
- [27] C.-S. Chou, W. Lo, K. Gokoffski, Y.-T. Zhang, F. Wan, A. Lander, A. Calof and Q. Nie, *Spatial dynamics of multistage cell lineages in tissue stratification*, **Biophysical Journal**, v99(10), (2010), pp. 3145-3154.
- [28] W. Hao, J.D. Hauenstein, B. Hu, Y. Liu, A.J. Sommesse and Y.-T. Zhang, *Multiple stable steady states of a reaction-diffusion model on zebrafish dorsal-ventral patterning*, **Discrete and Continuous Dynamical Systems - Series S**, v4(6), (2011), pp. 1413-1428.
- [29] S. Chen and Y.-T. Zhang, *Krylov implicit integration factor methods for spatial discretization on high dimensional unstructured meshes: application to discontinuous Galerkin methods*, **Journal of Computational Physics**, v230, (2011), pp. 4336-4352.  
doi:10.1016/j.jcp.2011.01.010
- [30] S. Zhao, J. Ovadia, X. Liu, Y.-T. Zhang and Q. Nie, *Operator splitting implicit integration factor methods for stiff reaction-diffusion-advection systems*, **Journal of Computational Physics**, v230, (2011), pp. 5996-6009.
- [31] Y.-T. Zhang, S. Chen, F. Li, H. Zhao and C.-W. Shu, *Uniformly accurate discontinuous Galerkin fast sweeping methods for Eikonal equations*, **SIAM Journal on Scientific Computing**, v33, (2011), pp. 1873-1896.
- [32] W. Hao, J.D. Hauenstein, B. Hu, Y. Liu, A.J. Sommesse and Y.-T. Zhang, *Bifurcation for a free boundary problem modeling the growth of a tumor with a necrotic core*, **Nonlinear Analysis: Real World Applications**, v13, (2012), pp. 694-709.
- [33] W. Hao, J.D. Hauenstein, B. Hu, Y. Liu, A.J. Sommesse and Y.-T. Zhang, *Continuation along bifurcation branches for a tumor model with a necrotic core*, **Journal of Scientific Computing**, v53, (2012), pp. 395-413.
- [34] Y. Liu and Y.-T. Zhang, *A robust reconstruction for unstructured WENO schemes*, **Journal of Scientific Computing**, v54, (2013), pp. 603-621.
- [35] Y.-T. Zhang, M.S. Alber, and S.A. Newman, *Mathematical modeling of vertebrate limb development*, **Mathematical Biosciences**, v243, (2013), pp. 1-17.  
doi:10.1016/j.mbs.2012.11.003 (one of five most downloaded articles in 2013.)
- [36] W. Hao, J.D. Hauenstein, C.-W. Shu, A.J. Sommesse, Z. Xu and Y.-T. Zhang, *A homotopy method based on WENO schemes for solving steady state problems of hyperbolic conservation laws*, **Journal of Computational Physics**, v250, (2013), pp. 332-346.  
doi: 10.1016/j.jcp.2013.05.008
- [37] T. Jiang and Y.-T. Zhang, *Krylov implicit integration factor WENO methods for semi-linear and fully nonlinear advection-diffusion-reaction equations*, **Journal of Computational Physics**, v253, (2013), pp. 368-388. doi: 10.1016/j.jcp.2013.07.015
- [38] L. Wu and Y.-T. Zhang, *A third order fast sweeping method with linear computational complexity for Eikonal equations*, **Journal of Scientific Computing**, v62, (2015), pp. 198-229. doi: 10.1007/s10915-014-9856-7

- [39] L. Wu, Y.-T. Zhang, S. Zhang, C.-W. Shu, *High order fixed-point sweeping WENO methods for steady state of hyperbolic conservation laws and its convergence study*, **Communications in Computational Physics**, v20, (2016), pp. 835-869. doi: 10.4208/cicp.130715.010216a
- [40] T. Jiang and Y.-T. Zhang, *Krylov single-step implicit integration factor WENO methods for advection-diffusion-reaction equations*, **Journal of Computational Physics**, v311, (2016), pp. 22-44. doi: 10.1016/j.jcp.2016.01.021
- [41] D. Lu and Y.-T. Zhang, *Krylov integration factor method on sparse grids for high spatial dimension convection-diffusion equations*, **Journal of Scientific Computing**, v69, (2016), pp. 736-763. doi: 10.1007/s10915-016-0216-7
- [42] D. Lu and Y.-T. Zhang, *Computational complexity study on Krylov integration factor WENO method for high spatial dimension convection-diffusion problems*, **Journal of Scientific Computing**, v73, (2017), pp. 980-1027. Published online: doi: 10.1007/s10915-017-0398-7
- [43] M. Machen and Y.-T. Zhang, *Krylov implicit integration factor methods for semi-linear fourth-order equations*, **Mathematics**, v5, (2017), article 63, pp. 1-18. doi: 10.3390/math5040063
- [44] D. Lu, S. Chen and Y.-T. Zhang, *Third order WENO scheme on sparse grids for hyperbolic equations*, **Pure and Applied Mathematics Quarterly**, v14, (2018), pp. 57-86. DOI: <https://dx.doi.org/10.4310/PAMQ.2018.v14.n1.a3>
- [45] R. Zhang, Y.-T. Zhang, Z. Wang, B. Chen and Y. Zhang, *A conservative numerical method for the fractional nonlinear Schrödinger equation in two dimensions*, **SCIENCE CHINA Mathematics**, v62, (2019), pp. 1997-2014. <https://link.springer.com/article/10.1007/s11425-018-9388-9>
- [46] R. Zhao, Y.-T. Zhang and S. Chen, *Krylov implicit integration factor WENO method for SIR model with directed diffusion*, **Discrete and Continuous Dynamical Systems - Series B**, v24 (9), (2019), pp. 4983-5001. <http://dx.doi.org/10.3934/dcdsb.2019041>
- [47] Y. Liu, Y. Cheng, S. Chen and Y.-T. Zhang, *Krylov implicit integration factor discontinuous Galerkin methods on sparse grids for high dimensional reaction-diffusion equations*, **Journal of Computational Physics**, v388, (2019), pp. 90-102. <https://doi.org/10.1016/j.jcp.2019.03.021>
- [48] Z. Zhao, Y.-T. Zhang and J. Qiu, *A modified fifth order finite difference Hermite WENO scheme for hyperbolic conservation laws*, **Journal of Scientific Computing**, v85, (2020), Article number: 29, pp. 1-22. <https://doi.org/10.1007/s10915-020-01347-1>
- [49] X. Zhu and Y.-T. Zhang, *Fast sparse grid simulations of fifth order WENO scheme for high dimensional hyperbolic PDEs*, **Journal of Scientific Computing**, v87, (2021), Article number: 44, pp. 1-38. <https://doi.org/10.1007/s10915-021-01444-9>
- [50] Z. Zhao, Y.-T. Zhang, Y. Chen and J. Qiu, *A Hermite WENO method with modified ghost fluid method for compressible two-medium flow problems*, **Communications in Computational Physics**, v30(3), (2021), pp. 851-873. <https://doi.org/10.4208/cicp.OA-2020-0184>
- [51] L. Li, J. Zhu and Y.-T. Zhang, *Absolutely convergent fixed-point fast sweeping WENO methods for steady state of hyperbolic conservation laws*, **Journal of Computational Physics**, v443, (2021), Article 110516, pp. 1-24. <https://doi.org/10.1016/j.jcp.2021.110516>

- [52] Y. Yang, W. Hao and Y.-T. Zhang, *A continuous finite element method with homotopy vanishing viscosity for solving the static Eikonal equation*, **Communications in Computational Physics**, v31(5), (2022), pp. 1402-1433. <https://doi.org/10.4208/cicp.OA-2021-0164>
  - [53] L. Li, J. Zhu, C.-W. Shu and Y.-T. Zhang, *A fixed-point fast sweeping WENO method with inverse Lax-Wendroff boundary treatment for steady state of hyperbolic conservation laws*, **Communications on Applied Mathematics and Computation**, v5(1), (2023), pp. 403-427. <https://doi.org/10.1007/s42967-021-00179-6>
  - [54] E. Tsybulnik, X. Zhu and Y.-T. Zhang, *Efficient sparse-grid implementation of a fifth-order multi-resolution WENO scheme for hyperbolic equations*, **Communications on Applied Mathematics and Computation**, v5(4), (2023), pp. 1339-1364. <https://doi.org/10.1007/s42967-022-00202-4>
  - [55] Z. M. Miksis and Y.-T. Zhang, *Sparse-grid implementation of fixed-point fast sweeping WENO schemes for Eikonal equations*, **Communications on Applied Mathematics and Computation**, v6(1), (2024).  
Published online first: <https://doi.org/10.1007/s42967-022-00209-x>
- Refereed Articles in Book Chapters and Proceedings
    - [1] Y.-T. Zhang and C.-W. Shu, *Third and fourth order Weighted ENO schemes for Hamilton-Jacobi equations on 2D unstructured meshes*, in **Hyperbolic Problems: Theory, Numerics, Applications**, T.Y.Hou and E.Tadmor, editors, Springer-Verlag, Berlin, 2003, pp. 941-950.
    - [2] Y.-T. Zhang, J. Shi, C.-W. Shu and Y. Zhou, *Resolution of high order WENO schemes and Navier-Stokes simulation of the Rayleigh-Taylor instability problem*, in **Computational Fluid and Solid Mechanics 2003**, K.J. Bathe, Editor, the Proceedings of the Second MIT Conference on Computational Fluid and Solid Mechanics, June 17-20, 2003, volume 1, pp. 1216-1218, Elsevier Science.
    - [3] Y.-T. Zhang, H.-K. Zhao and J. Qian, *High order fast sweeping methods for Eikonal equations*, in **the Proceedings of the 74th SEG Annual International Meeting**, Society of Exploration Geophysicists, volume 23, pp. 1901-1904, 2004.
    - [4] S.A. Newman, S. Christley, T. Glimm, H.G.E. Hentschel, B. Kazmierczak, Y.-T. Zhang, J. Zhu and M. Alber, *Multiscale models for Vertebrate limb development*, **Current Topics in Developmental Biology**, v81, pp. 311-340, 2008.
    - [5] Q. Nie and Y.-T. Zhang, *Cell Biology Modeling Development*, **Encyclopedia of Applied and Computational Mathematics**, Björn Engquist, Editor, Springer-Verlag, 2015, pp. 183-189.
    - [6] Y.-T. Zhang and C.-W. Shu, *ENO and WENO schemes*, in **Handbook of Numerical Analysis**, Volume 17, Handbook of Numerical Methods for Hyperbolic Problems: Basic and Fundamental Issues. North-Holland, Elsevier, Amsterdam, 2016, pp.103-122.

## Awards and Honors

- Rev. Edmund P. Joyce, C.S.C. Award for Excellence in Undergraduate Teaching, 2020, University of Notre Dame.

- Ralph E. Powe Junior Faculty Enhancement Award, 2008, Oak Ridge Associated Universities (ORAU).
- Simon Ostrach Graduate Dissertation Fellowship, 2002-2003, Brown University.
- Guang Hua Fellowship for Excellent Graduate Students, 1997-1998, Nankai University.
- University Fellowship for Excellent Graduate Students, 1996-1997, Nankai University.
- Wang Kechang Fellowship for Excellent Undergraduate Students, 1993-1995, Nankai University.
- University Fellowship for Excellent Undergraduate Students, 1992-1993, Nankai University.
- Certificate of National Mathematical Contest in Modeling, 1995, Chinese Society for Industry and Applied Mathematics.

### Current Research Interests

- Numerical Methods and Scientific Computing: researching high order accuracy numerical methods for PDEs, including weighted ENO finite volume / finite difference methods, discontinuous Galerkin (DG) finite element methods, large time step schemes (e.g., implicit integration factor schemes and their high dimensional implementation, and other exponential integrators), fast and robust iterative methods (e.g., fast sweeping methods for steady state problems), sparse grid methods for high dimensional problems, and high order accuracy numerical methods on unstructured meshes for complex domain geometries, etc.
- Applications: numerical solution of PDEs arising in computational biology (e.g., morphogenesis, tissue patterning, and population dynamics, etc), and computational physics (e.g., interaction of shock waves with vortices, interaction of shock waves with Rayleigh-Taylor flow, and other computational fluid dynamics problems); mathematical modeling and computational analysis of biological and physical problems.

### Academic Experience

- Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, July 2017 – Present. Courses: ACMS 20620 *Applied Linear Algebra* (Spring 2019, Fall 2019, Spring 2021, Fall 2021, Fall 2022); ACMS 20750 *Introduction to Applied Mathematics Methods II* (Fall 2017, Fall 2018, Spring 2020, Spring 2022, Spring 2023, Fall 2023); ACMS 40212 / 60212 *Advanced Scientific Computing* (Spring 2018); ACMS 60690 *Numerical Analysis I* (Fall 2020); ACMS 60790 *Numerical Analysis II* (Spring 2018); ACMS 80770 *Topics in Applied Mathematics for graduate students* (Spring 2019, Spring 2021).
- Associate Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, July 2011 – June 2017. Courses taught: ACMS 60690 *Numerical Analysis I* (Fall 2011, Fall 2013, Fall 2014); ACMS 20620 *Applied Linear Algebra* (Fall 2011); ACMS 80770 *Topics in Applied Mathematics for graduate students* (Spring 2012); ACMS 40395 / 60395 *Numerical Linear Algebra* (Fall 2012, Spring 2015, Spring 2016); ACMS 20750 *Introduction to Applied Mathematics Methods II* (Spring 2013, Spring 2014); ACMS 40790 *Topics in Applied Mathematics for undergraduate students* (Fall 2015).

- Assistant Professor, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, July 2010 – June 2011. Courses taught: ACMS 60690 *Numerical Analysis I* (Fall 2010); ACMS 20210 *Scientific Computing* (Spring 2011); ACMS 20620 *Applied Linear Algebra* (Spring 2011).
- Assistant Professor, Department of Mathematics, University of Notre Dame, July 2006 – June 2010. Courses taught: Math 10260 *Elements of Calculus II-Business* (Fall 2006, Spring 2007); Math 60650 *Partial Differential Equations* (Spring 2007); Math 10350 *Calculus A* (Fall 2007); Math 20580 *Introduction to linear algebra and differential equations* (Fall 2008); Math 20210 *computer programming* (Spring 2009); Math 60690 *Numerical Analysis I* (Fall 2007, Fall 2008); Math 60790 *Numerical Analysis II (Numerical PDEs)* (Spring 2008).
- Visiting Assistant Professor, Department of Mathematics, University of California, Irvine, July 2003 – June 2006. Courses taught: Math2A *differential Calculus* (Fall 2004, Fall 2003); Math2B *integral Calculus* (Winter 2005, Winter 2004, Fall 2005); Math2J *Linear Algebra and Infinite Series* (Spring 2004); Math7 *Basic Statistics* (Spring 2005, Winter 2006, Spring 2006).
- Research Assistant, Division of Applied Mathematics, Brown University, September 1999 – August 2000 and June 2001 – May 2003.
- Teaching Assistant: *Methods of Applied Mathematics I, II*, Division of Applied Mathematics, Brown University, September 2000 – May 2001.
- Teaching Assistant: *Advanced Mathematics*, School of Mathematical Science, Nankai University, P.R. China, September 1997 – January 1998.

## Professional Membership

- Member of *Society for Industrial and Applied Mathematics (SIAM)*. 2002 – present.

## Other Professional Activities:

- Serving as Referee for professional Journals including: Journal of Scientific Computing; Journal of Computational Physics; Communications on Applied Mathematics and Computation; SIAM Journal on Scientific Computing; Communications in Computational Physics; Computers & Fluids; SIAM Journal on Numerical Analysis; Mathematics of Computation; Numerical Algorithms; Numerical Methods for Partial Differential Equations; Computers and Mathematics with Applications; BIT Numerical Mathematics; Journal of Computational and Applied Mathematics; Applied Mathematics and Computation; Journal of Computational Mathematics; International Journal for Numerical Methods in Engineering; Mathematics and Computers in Simulation; International Journal for Numerical Methods in Fluids; International Journal of Computer Mathematics; Journal of Fluids Engineering; Advances in Water Resources; Combustion and Flame; Transportmetrica; Computers in Biology and Medicine; BioEssays; Journal of Theoretical Biology; Mathematical Biosciences and Engineering; International Journal of Biological Sciences; Journal of the Royal Society Interface; Biomicrofluidics; International Journal of Biomedical Imaging; FEBS Letters; Physical Biology; Scholarpedia; SIAM Journal on Applied Mathematics; Methods and Applications of



Analysis; Discrete and Continuous Dynamical Systems - Series B; Nonlinearity; Mathematical Methods in the Applied Sciences; Indian Journal of Pure and Applied Mathematics; Computer Methods in Applied Mechanics and Engineering; Research in the Mathematical Sciences; Annals of Mathematical Sciences and Applications; SCIENCE CHINA Mathematics; Communications in Applied Mathematics and Computational Science; Computational Methods in Applied Mathematics; Multiscale Modeling and Simulation; Advances in Computational Mathematics; Numerical Mathematics: Theory, Methods and Applications; Studies in Applied Mathematics; IMA Journal of Numerical Analysis.

## Conference Organized

- Mini-symposium on Fast Numerical Methods for High Dimensional Problems, Co-Organizer; the International Conference on Scientific Computation and Differential Equations (SciCADE2022), the University of Iceland, Reykjavik, Iceland, July 25 - 29, 2022.
- Workshop on the numerical methods for PDEs, Co-Organizer; August 7 - 9, 2015, Nankai University, Tianjin, P.R. China.
- Mini-symposium on Modeling and Numerical Methods for Complex Systems in Developmental and Cell Biology, Co-Organizer; SIAM Conference on the Life Sciences, August 4-7, 2014, Charlotte, North Carolina.
- International Summer School on Fundamental Algorithms and Computable Modeling in High-Performance and Multi-scale Scientific / Engineering Computing, Co-Organizer; July 12 - 19, 2012, Nankai University, Tianjin, P.R. China.
- Midwest Numerical Analysis Day 2012, Co-Organizer; May 12 - 13, 2012, University of Notre Dame, Notre Dame, IN.
- Mini-symposium on Weighted Essentially Non-Oscillatory Schemes, Co-Organizer; the 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011), July 18-22, 2011, Vancouver, BC, Canada.
- Special Session on Computation, Analysis, Modeling in PDE and their Applications, Co-Organizer; 2010 AMS Fall Central Section Meeting, November 5-7, 2010, Notre Dame, IN.
- Mini-symposium on Computational PDEs and modelling of complex biological systems, Organizer; SIAM Conference on the Life Sciences, July 12-15, 2010, Pittsburgh, Pennsylvania.
- Mini-symposium on Modeling of Gene Regulatory Network and Cellular Signaling, Organizer; SIAM Conference on Life Sciences, August 4-7, 2008, Montreal, Quebec, Canada.
- Mini-symposium on Advances in Numerical Methods for PDEs and Their Applications, Co-Organizer; 2008 SIAM Annual Meeting, July 7-11, 2008, San Diego, CA.

## Invited Lectures and Conferences

- Invited Lectures (**after I came to Notre Dame**)
  - Invited Speaker, The SIAM Central States Section (CSS) Computational and Applied Mathematics Forum, University of Oklahoma, Norman, OK, USA. Sep. 28, 2023.

- Invited Lecture, Mini-symposium on “Numerical methods for Hamilton-Jacobi equations and their applications”, The 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023), Waseda University, Tokyo, Japan. August 20 - 25, 2023.
- Invited Speaker, The Fifth International Workshop on Development and Application of High-Order Numerical Methods, Ocean University of China, Qingdao, China. August 9-12, 2023.
- Invited Lecture, Mini-symposium on Fast Numerical Methods for High Dimensional Problems, the International Conference on Scientific Computation and Differential Equations (SciCADE2022), the University of Iceland, Reykjavik, Iceland, July 25 - 29, 2022.
- Colloquium, Department of Mathematics, Statistics, and Physics, Wichita State University, Wichita, Kansas, USA. April 29, 2022, Online talk.
- Colloquium, School of Mathematical Sciences, Ocean University of China, Qingdao, China. Nov. 24, 2021, Online talk.
- Numerical Analysis and PDE Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE, USA. Oct. 22, 2021, Online talk.
- Invited Speaker, Workshop on Advances and Challenges in Hyperbolic Conservation Laws, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI, USA. May 17 - 21, 2021. Online Conference.
- Computational and Applied Mathematics Seminar, Department of Mathematics, Iowa State University, Ames, IA, USA. Nov. 16, 2020, Online talk.
- Invited Speaker, Workshop on high order accuracy WENO schemes: new development and their applications, Xiamen University, Xiamen, China. Nov. 15 - Nov. 17, 2020. Online Conference.
- Computational and Applied Mathematics Colloquium, Department of Mathematics, The Pennsylvania State University, University Park, PA, USA. October 20, 2020, Online talk.
- Invited Speaker, Lectures Series on High-Order Numerical Methods, School of Mathematical Sciences, University of Science and Technology of China, Hefei, China. July 27 - August 14, 2020. Online Conference.
- Applied Mathematics seminar, Department of Mathematics, Nanjing University of Aeronautics and Astronautics, Nanjing, China. June 26, 2019.
- Applied Math Colloquium, School of Mathematical Sciences, University of Electronic Science and Technology of China, Chengdu, China. June 4, 2019.
- Applied Mathematics seminar, School of Mathematical Sciences, Zhejiang University, Hangzhou, China. June 3, 2019.
- Invited Speaker, the 11th International Conference on Scientific Computing and Applications, Xiamen University, Xiamen, China. May 26-31, 2019.
- Invited Lecture, Special Session on New Trends in Numerical Methods for Partial Differential Equations: Theory and Applications, 2018 Fall AMS Central Sectional Meeting, University of Michigan, Ann Arbor, MI, October 20-21, 2018. Talk title: “Sparse grid WENO schemes for high spatial dimension convection-diffusion and hyperbolic equations”.
- Applied and Computational Mathematics Seminar, Interdisciplinary Mathematics Institute, Department of Mathematics, University of South Carolina, Columbia, SC, USA, Oct. 16, 2017. Talk title: “Sparse grid Krylov IIF and WENO schemes for high spatial dimension convection-diffusion and hyperbolic equations”.

- Invited Lecture, Mini-symposium on Recent Advances of Modeling and Computational Techniques in Biological Engineering, the 2017 SIAM Conference on Computational Science and Engineering, February 27 - March 3, 2017, Atlanta, Georgia. Talk title: “Krylov Integration Factor Method on Sparse Grids for High Spatial Dimension Convection-Diffusion-Reaction Equations”.
- Plenary speaker, The Third International Workshop on Development and Application of High-Order Numerical Methods, On the occasion of the 60th birthday of Professor Chi-Wang Shu, University of Science and Technology of China, Hefei, China, December 17 - 19, 2016. Talk title: “Professor Chi-Wang Shu’s contribution to academic”.
- Invited Lecture, Special Session on Recent developments of high-order numerical methods, the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, July 1 - 5, 2016, Orlando, Florida. Talk title: “Krylov integration factor method on sparse grids for high spatial dimension convection-diffusion equations”.
- Applied Mathematics seminar, Department of Mathematics, Ohio State University, Oct 22, 2015. Talk title: “Krylov implicit integration factor methods for high order and high dimensional spatial discretizations and their applications”.
- Invited Lecture, Mini-symposium on Recent development and applications of weighted essential non-oscillatory methods, ICIAM 2015 - the 8th International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Beijing, China. Talk title: “High order fixed-point WENO sweeping method for steady state problems”.
- Invited Lecture, Mini-symposium on Modeling and Simulations of Complex Biological Systems, ICIAM 2015 - the 8th International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Beijing, China. Talk title: “Single-step implicit integration factor methods for advection-diffusion-reaction equations”.
- Invited Lecture, Mini-symposium on Progress in hyperbolic problems and applications, ICIAM 2015 - the 8th International Congress on Industrial and Applied Mathematics, August 10 - 14, 2015, Beijing, China. Talk title: “Krylov implicit integration factor WENO methods for high dimensional convection-diffusion problems”.
- Invited Speaker, Workshop on the numerical methods for PDEs, August 7 - 9, 2015, Nankai University, Tianjin, China. Talk title: “Krylov implicit integration factor methods for high order and high dimensional spatial discretizations and their applications”.
- Applied Math Colloquium, School of Mathematical Sciences, Xiamen University, Xiamen, China, July 27, 2015. Talk title: “Krylov implicit integration factor methods for high order and high dimensional spatial discretizations and their applications”.
- Applied Mathematics seminar, Department of Mathematics, Michigan State University, East Lansing, MI, May 1, 2015. Talk title: “Krylov implicit integration factor methods for high order and high dimensional spatial discretizations and their applications”.
- Invited Lecture, Mini-symposium on Recent Advances in High Order Spatial Discretization Methods for PDEs, the 2015 SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah. March 14-18, 2015. Talk title: “High Order WENO Method for Steady State Problems”.
- Invited Lecture, Mini-symposium on Modeling and Numerical Methods for Complex Systems in Developmental and Cell Biology, SIAM Conference on the Life Sciences, Charlotte, North Carolina. August 4-7, 2014. Talk title: “Numerical Studies on Cell Lineage Models”.

- Invited Lecture, Mini-symposium on Challenges in mathematical modeling of pattern formation in developmental biology, the Joint Annual Meeting of the Japanese Society for Mathematical Biology and the Society for Mathematical Biology, July 28 - August 1, 2014. Osaka, Japan. Talk title: “Numerical Studies on Cell Lineage Models”.
- Invited Speaker, Workshop on Modeling, Simulation & Analysis of Pattern Formation, Tohoku University, Sendai, Japan. July 26 - July 27, 2014. Talk title: “Computational methods in pattern formation solutions”.
- Invited Speaker, the 2014 Indiana-Illinois Workshop on Scientific Computing, Apr 26, 2014. Purdue University, West Lafayette, IN. Talk title: “High order fast numerical methods with linear computational complexity for solving steady state problems of hyperbolic PDEs”.
- Invited Lecture, Mini-symposium on High Order Numerical Methods for Hyperbolic and Kinetic Equations, SIAM Conference on Analysis of Partial Differential Equations, Lake Buena Vista, FL. Dec 7 - 10, 2013. Talk title: “High Order Fast Sweeping and Homotopy Methods with Linear Computational Complexity for Solving Steady State Problems of Hyperbolic PDEs”.
- Invited 45-minute Speaker talk, The sixth International Congress of Chinese Mathematicians (ICCM 2013). Taipei, Taiwan. July 14 - 19, 2013. Talk title: “High order numerical methods with linear computational complexity for solving steady state problems of hyperbolic PDEs”.
- Invited Speaker, International workshop on PDE modeling and computation in Biology, University of Science and Technology of China, Hefei, Anhui, P.R.China. July 8 - 11, 2013. Talk title: “Krylov implicit integration factor methods for solving morphogenesis problems”.
- Invited Lectures, Institute of Applied Physics and Computational Mathematics, Beijing, P.R. China, May 28-30, 2013. Two talks: “High order numerical methods with linear computational complexity for solving steady state problems of some hyperbolic PDEs”; “A robust unstructured WENO reconstruction and implicit integration factor methods for stiff advection-diffusion-reaction equations”.
- Applied Math Colloquium, Beijing Institute of Technology, Beijing, P.R. China, May 23, 2013. Talk title: “Krylov implicit integration factor methods for semilinear and fully nonlinear advection-diffusion-reaction equations”.
- Invited Speaker, the second international workshop on Development and Application of High-Order Numerical Methods, Xiamen, Fujian, P.R.China, May 18-21, 2013. Talk title: “High order numerical methods with linear computational complexity for solving steady state problems of hyperbolic PDEs”.
- Invited Speaker, 2013 Clifford Lectures Conference, Tulane University, New Orleans, LA. March 13-16, 2013. Talk title: “A third order fast sweeping method with linear computational complexity”.
- Invited Lecture, Mini-symposium on Theoretical and Computational Advances in Time Dependent PDEs, SIAM Conference on Computational Science and Engineering (CSE13), Boston, MA. Feb 25 - Mar 1, 2013. Talk title: “Krylov Implicit Integration Factor WENO methods for advection-diffusion-reaction systems”.
- Invited Lecture, Mini-symposium on Computational Modeling of Regenerative Medicine and Cellular Pattern Formation, the 34th Annual International Conference of the IEEE

- Engineering in Medicine and Biology Society, San Diego, CA. August 28 - September 1, 2012. Talk title: “Modeling and Computational Methods for Zebrafish Patterning and Limb Development”.
- Applied Mathematics seminar, Department of Mathematics, University of Utah, Salt Lake City, UT. August 27, 2012. Talk title: “Computational methods in pattern formation solutions”.
  - Invited Lectures, International Summer School on Fundamental Algorithms and Computable Modeling in High-Performance and Multi-scale Scientific / Engineering Computing, July 12 - 19, 2012, Nankai University, Tianjin, China. I gave 3 three-hour lectures on “Convection-Reaction-Diffusion Equations; WENO and Discontinuous Galerkin Numerical Methods and Applications”.
  - Applied and Computational Mathematics Colloquium, School of Mathematical Sciences, Nankai University, Tianjin, P.R. China. July 12, 2012. Talk title: “Computational methods in pattern formation solutions”.
  - Applied and Computational Mathematics Colloquium, Hefei Center of Mathematics and Interdisciplinary Sciences of China, School of Mathematical Sciences, University of Science and Technology of China, Hefei, P.R.China. July 10, 2012. Talk title: “High order fast sweeping methods”.
  - Applied and Computational Mathematics seminar, Department of Mathematics, University of California Irvine, Irvine, CA, May 21, 2012. Talk title: “Computational methods in pattern formation solutions”.
  - Invited Lecture, Mini-symposium on Recent Advances in Numerical PDEs and Computational Biology, 36th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama, Huntsville, AL, March 24 - 25, 2012. Talk title: “Krylov implicit integration factor methods and applications in pattern solutions”.
  - Invited Lecture, Mini-symposium on Modeling Complex Biological Systems: Theoretical and Computational Studies, 36th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama, Huntsville, AL, March 24 - 25, 2012. Talk title: “WENO computations and pattern formation of a chemotactic cell movement model”.
  - Invited Lecture, Scientific Computing Seminar, Division of Applied Mathematics, Brown University, Providence, RI, Feb 17, 2012. Talk title: “High order fast sweeping methods”.
  - Invited Lecture, Second Workshop on Computational Issues in Nonlinear Control (supported by AFOSR and NSF), Nov 7-8, 2011, Monterey, California, USA. Talk title: “Fast sweeping methods based on WENO and DG local solvers”.
  - Invited Lecture, Mini-symposium on High Order Numerical Methods for Partial Differential Equations, AMMCS 2011 - the International Conference on Applied Mathematics, Modeling and Computational Science, July 25 - 29, 2011, Waterloo, Ontario, Canada. Talk title: “WENO methods for cell chemotactic movement models”.
  - Invited Lecture, Mini-symposium on Computational Methods for Hyperbolic Problems, AMMCS 2011 - the International Conference on Applied Mathematics, Modeling and Computational Science, July 25 - 29, 2011, Waterloo, Ontario, Canada. Talk title: “Causality indicators for developing uniformly accurate discontinuous Galerkin fast sweeping methods”.
  - Invited Lecture, Mini-symposium on Efficient Numerical Methods for Hamilton-Jacobi Equations, ICIAM 2011 - the 7th International Congress on Industrial and Applied

- Mathematics, July 18 - 22, 2011, Vancouver, BC, Canada. Talk title: “A uniformly accurate second order fast sweeping method for Eikonal equations”.
- Invited Lecture, Mini-symposium on Theory, Modeling and Simulation of Polyelectrolyte Membranes, ICIAM 2011 - the 7th International Congress on Industrial and Applied Mathematics, July 18 - 22, 2011, Vancouver, BC, Canada. Talk title: “Operator splitting implicit integration factor methods for stiff reaction-diffusion-advection systems”.
  - Invited Lecture, Mini-symposium on Weighted Essentially Non-Oscillatory Schemes, ICIAM 2011 - the 7th International Congress on Industrial and Applied Mathematics, July 18 - 22, 2011, Vancouver, BC, Canada. Talk title: “Fast WENO computations by fast sweeping and implicit integration factor methods”.
  - Invited Lecture, Workshop on Development and Application of High-Order Numerical Methods, Xiamen, Fujian, P.R. China, June 20, 2011. Talk title: “Robust reconstructions for unstructured WENO schemes”.
  - Applied Math Colloquium, Beijing Institute of Technology, Beijing, P.R. China, June 10, 2011. Talk title: “Development of High Accuracy Numerical Methods and Computational Analysis of Morphogenesis”.
  - Colloquium, School of Mathematical Sciences, Nankai University, Tianjin, P.R. China, June 8, 2011. Talk title: “Development of High Accuracy Numerical Methods and Computational Analysis of Morphogenesis”.
  - Invited Lectures, Workshop on High order Numerical Methods for Multimedia Flows, Beijing International Center for Computational Physics, June 6-12, 2011, Beijing, China. I gave 3 two-hour lectures on “High order numerical methods for Hamilton-Jacobi equations and conservation laws”.
  - Invited Lecture, Ethics in Science Workshop, College of Science, University of Notre Dame, Notre Dame, IN. April 9, 2011. Talk title: “Ethics in Mathematical and Computational Biology”.
  - Invited Lecture, Mini-symposium on High-Order Time-Stepping Methods and Their Applications, 2010 SIAM Annual Meeting, July 12-16, 2010, Pittsburgh, Pennsylvania. Talk title: “Implicit integration factor methods for spatial discretization on high dimensional unstructured meshes”.
  - Invited Lecture, Mini-symposium on Computational PDEs and modelling of complex biological systems, SIAM Conference on the Life Sciences, July 12-15, 2010, Pittsburgh, Pennsylvania. Talk title: “Computational analysis of Tiktaalik roseae pectoral fin development”.
  - Invited Lecture, Special Session on Numerical methods for Application in Mathematical Biology, the Tenth International Conference Computational and Mathematical Methods in Science and Engineering, May 24-26, 2010, Madison, Wisconsin. Talk title: “Implicit integration factor methods and their applications in morphogenesis”.
  - Invited Lecture, Center for Complex Biological Systems and Center for Mathematical and Computational Biology Seminar, University of California, Irvine, CA, October 14, 2009. Talk title: “Computational modeling of limb development”.
  - Invited Lecture, Mini-symposium on Advances in discontinuous Galerkin methods for partial differential equations, the 10th United States National Congress on Computational Mechanics (USNCCM-10), Columbus, OH, July 16-19, 2009. Talk title: “Uniformly accurate discontinuous Galerkin fast sweeping methods for Eikonal equations”.

- Applied Mathematics Colloquia, Department of Applied Mathematics, Illinois Institute of Technology, Chicago, IL, May 6, 2009. Talk title: “Development of high accuracy numerical methods and computational analysis of morphogen systems”.
- Invited Lecture, Mini-symposium on Spectral and Pseudo-spectral Methods in Scientific Computing, The 33rd SIAM Southeastern-Atlantic Section Annual Meeting, April 4-5, 2009, University of South Carolina, Columbia, SC. Talk title: “Applications of discontinuous Galerkin methods in computational developmental biology”.
- PDE, Complex Analysis and Differential Geometry Seminar, Department of Mathematics, University of Notre Dame, Notre Dame, IN, February 24, 2009. Talk title: “Uniformly accurate discontinuous Galerkin fast sweeping methods for Eikonal equations”.
- Applied Mathematics seminar, Department of Mathematics, Michigan State University, East Lansing, MI, November 21, 2008. Talk title: “Applications of Discontinuous Galerkin Methods in Computational Developmental Biology”.
- Mathematical Research at Notre Dame lecture, Department of Mathematics, University of Notre Dame, Notre Dame, IN, November 7, 2008. Talk title: “High Order Numerical Methods for PDEs”.
- Invited Lecture, Workshop on Recent Developments in Numerical Methods for Nonlinear Hyperbolic Partial Differential Equations and their Applications, August 31 - September 5, 2008, Banff, Canada. Talk title: “Uniformly accurate Discontinuous Galerkin fast sweeping methods”.
- Invited Lecture, Mini-symposium on Modeling of Gene Regulatory Network and Cellular Signaling, SIAM Conference on Life Sciences, August 4-7, 2008, Montreal, Quebec, Canada. Talk title: “Application of Discontinuous Galerkin methods for reaction-diffusion systems in developmental biology”.
- Invited Lecture, Mini-symposium on Fast sweeping methods for Hamilton-Jacobi Equations, 2008 SIAM Annual Meeting, July 7-11, 2008, San Diego, CA. Talk title: “Discontinuous Galerkin fast sweeping methods”.
- Invited Lecture, Special Session on Finite Element Methods and Applications, 2008 Spring AMS Central Section Meeting, Bloomington, IN, April 5-6, 2008. Talk title: “Discontinuous Galerkin fast sweeping methods”.
- PDE, Complex Analysis and Differential Geometry Seminar, Department of Mathematics, University of Notre Dame, Notre Dame, IN, February 26, 2008. Talk title: “Discontinuous Galerkin fast sweeping methods”.
- Invited Lecture, Workshop on Discontinuous Galerkin Methods for Partial Differential Equations, Banff, Canada, Nov 25-30, 2007. Talk title: “Application of a discontinuous Galerkin finite element method to reaction-diffusion systems in developmental biology”.
- Invited Lecture, 2007 Midwest Conference on Systems Biology, East Lansing, Michigan, Oct 27-28, 2007. Talk title: “Computational analysis of BMP gradients in dorsal-ventral patterning of the zebrafish embryo”.
- Invited Lecture, Mini-symposium on Finite Element Methods in Environmental Fluid Mechanics, 9th United States National Congress on Computational Mechanics (USNCCM-9), San Francisco, CA, July 22-26, 2007. Talk title: “Fast sweeping methods with a discontinuous Galerkin local solver for Eikonal equations”.

- Invited Lecture, Workshop on Discontinuous Galerkin Method and its applications, Beijing, China, June 13-17, 2007. Talk title: “High order fast sweeping methods based on WENO and DG local solvers”.
  - Invited Lecture, Mini-symposium on High Order Discontinuous Galerkin Methods and Applications, International Conference On Spectral and High Order Methods, Beijing, China, June 18-22, 2007. Talk title: “An operator splitting Discontinuous Galerkin finite element method for stiff reaction-diffusion systems”.
  - Invited Lecture, Mini-symposium on High Order WENO Schemes and Applications, International Conference On Spectral and High Order Methods, Beijing, China, June 18-22, 2007. Talk title: “Third order WENO schemes on three dimensional tetrahedral meshes”.
  - Colloquium, Department of Mathematics, Nanjing University, Nanjing, Jiangsu, P.R. China, June 6, 2007. Talk title: “Computational Analysis of BMP Gradients in Dorsal-ventral Patterning of the Zebrafish Embryo”.
  - PDE, Complex Analysis and Differential Geometry Seminar, Department of Mathematics, University of Notre Dame, Notre Dame, IN, April 24, 2007. Talk title: “Weighted Essentially Non-Oscillatory schemes for Hyperbolic PDEs on unstructured meshes”.
  - Mathematical Sciences Colloquium, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY, March 12, 2007. Talk title: “Computational Analysis of BMP Gradients in Dorsal-ventral Patterning of the Zebrafish Embryo”.
- **Invited Lectures (before I came to Notre Dame)**
    - Invited Lecture, Mini-symposium on Fast Sweeping Methods for Hamilton-Jacobi Equations: Updates, Algorithms and Applications, SIAM Conference on Analysis of Partial Differential Equations, Boston, MA, July 9-12, 2006. Talk title: “Fast sweeping methods for Eikonal equations on triangular meshes”.
    - Invited Lecture, Mini-symposium on Biomechanics of Tissues, 15th U.S. National Congress on Theoretical and Applied Mechanics, Boulder, CO, June 25-30, 2006. Talk title: “Computational Analysis of Morphogen Gradients”.
    - Special Colloquium, School of Computational Science, Florida State University, Tallahassee, FL, Feb 22, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
    - Special Colloquium, Department of Mathematics, the University of Tennessee, Knoxville, TN, Feb 17, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
    - Special Colloquium, Department of Mathematics, Oregon State University, Corvallis, OR, Feb 13, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
    - Special Colloquium, Department of Mathematics, University of Kentucky, Lexington, KY, Feb 10, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
    - Special Colloquium, Department of Mathematics, University of Kansas, Lawrence, KS, Feb 7, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.



- Special Colloquium, Department of Mathematics and Statistics, South Dakota State University, Brookings, SD, Jan 30, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Special Colloquium, Department of Mathematics, University of Notre Dame, Notre Dame, IN, Jan 25, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Special Colloquium, Department of Mathematics, Purdue University, West Lafayette, IN, Jan 23, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Special Colloquium, Department of Mathematics, Iowa State University, Ames, IA, Jan 19, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Special Colloquium, Department of Mathematical Sciences, University of Colorado at Denver and Health Sciences Center, Denver, CO, Jan 17, 2006. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Invited Lecture, Mini-symposium on Mathematical Biology, 12th International Conference of The Forum for Interdisciplinary Mathematics on Statistics, Combinatorics, Mathematics and Applications, Auburn University, Auburn, Alabama, December 2-4, 2005. Talk title: “Computational Analysis of Morphogen Gradients during embryo development”.
- Applied Mathematics Seminar Talk, Department of Mathematics, The Ohio State University, Columbus, OH, March 31, 2005. Talk title: “Computational Analysis of Dorsal-Ventral patterning and Neurogenesis during Embryo Development”.
- Invited Lecture, Mini-symposium on Quantitative Studies of Complex Systems in Cell and Developmental Biology, 2nd SIAM Conference on the Life Sciences, Portland, Oregon, July 11-14, 2004. Talk title: “Role of Chordin and Tolloid on dorsalventral patterning of the zebrafish”.
- Invited Lecture, Mini-symposium on High Order Numerical Methods for Hamilton-Jacobi Equations and Applications, International Conference On Spectral and High Order Methods, Providence, RI, June 21-25, 2004. Talk title: “High order fast sweeping methods for static Hamilton-Jacobi equations”.
- Invited Lecture, Mini-symposium on Weighted Essentially Non-Oscillatory Method and Its Applications, International Conference On Spectral and High Order Methods, Providence, RI, June 21-25, 2004. Talk title: “Resolution and numerical viscosity of high order finite difference WENO schemes”.
- Invited Lecture, The Second Reunion Conference for IPAM’s “Geometrically Based Motions” Program. UCLA Conference Center, Lake Arrowhead, California, December 7-12, 2003. Talk title: “High order fast sweeping methods for Eikonal equations: preliminary results”.
- Contributed Lectures/Posters
  - Poster session, Harvey Mudd College Mathematics Conference on Scientific Computing, Harvey Mudd College, Claremont, CA, November 5, 2005. Poster title: “Computational analysis of the BMP activity gradient in the Drosophila and Zebrafish embryos”.

- Poster session, Southern California Applied Mathematics Symposium and SIAM Southern California Section Meeting, University of Southern California, Los Angeles, CA, April 24, 2005. Poster title: “Computational analysis of the BMP activity gradient in the *Drosophila* and Zebrafish embryos”.
- Poster Session, First Young Researchers Workshop in Mathematical Biology, Mathematical Biosciences Institute, The Ohio State University, Columbus, OH, March 29 - April 1, 2005. Poster title: “Role of Chordin and Tolloid on dorsalventral patterning of the zebrafish”.
- Contributed Lecture, Ninth International Conference on Hyperbolic Problems: Theory, Numerics, Applications. California Institute of Technology, Pasadena, CA. March 25-29, 2002. Talk title: “High order WENO schemes for Hamilton-Jacobi equations on triangular meshes”.
- Participant
  - Frontiers in Applied and Computational Mathematics, the 60th Birthday Conference in honor of Professor Chi-Wang Shu, January 4 - 6, 2017, Brown University, Providence, RI.
  - IMA Hot Topics Workshop: Medical Device-Biological Interactions at the Material-Tissue Interface, Institute for Mathematics and its Applications (IMA), University of Minnesota, Minneapolis, MN, September 13-15, 2010.
  - Frontiers in Mathematical Biology: NSF-NIH PIs Meeting 2010. April 26-27, 2010, University of Maryland, College Park, MD.
  - International Conference on Advances in Scientific Computing. December 6-8, 2009, Brown University, Providence, Rhode Island.
  - Fast Sweeping day. Rice University, Houston, TX, April 6, 2007.
  - Biology and Mechanics: Applications of Mathematics and Computations. University of California, Irvine, May 25-26, 2006.
  - International Conference on the Research Trend for PDE Modeling and Computation, In honor of David Gottlieb’s 60th Birthday. Brown University, November 7-8, 2004.
  - Vanderbilt University Summer Conference on Mathematical Models in Signaling Systems, Nashville, Tennessee, June 16-18, 2004.
  - International Conference on Scientific Computing, Partial Differential Equations and Image Processing, On the Occasion of Stanley Osher’s 60th birthday. UCLA, April 5-7, 2002.

## Service

- Member of the Committee on Reappointment, Promotion and Tenure (CRPT), Department of Applied and Computational Mathematics and Statistics (ACMS), University of Notre Dame, 2019 –
- Member of the Committee on Appointments (CA), Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, 2019 –
- Chair, Search Committee for Lumpkins Postdoctoral Fellow in Applied Math, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, September 2022 – November 2022.

- Member of the ACMS Award Committee, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, 2019 – 2021.
- The faculty advisor of the Committee in charge of the ACMS monitor, 2019 –
- Member of the ad hoc Selection Committee for the Joyce Teaching Awards, College of Science, University of Notre Dame, April 2021.
- Member of the ad hoc Graduate Student Appeal Committee, April, 2019; Jan 2021.
- Member of the Committee on Appointments and Promotions (CAP), Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, 2011 – 2019.
- Director of Undergraduate Studies, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, 2012 – 2016.
- Chair of the undergraduate studies committee, Department of Applied and Computational Mathematics and Statistics (ACMS), University of Notre Dame, 2014 – 2016.
- Member of the graduate studies committee, Department of Applied and Computational Mathematics and Statistics (ACMS), University of Notre Dame, 2014 – 2016.
- Member of ND-ZJU Faculty Curriculum Committee, University of Notre Dame, 2014 – 2016.
- Colloquium Chair, Department of Applied and Computational Mathematics and Statistics (ACMS), University of Notre Dame, 2011 – 2012.
- Member of College Computing Committee, College of Science, University of Notre Dame, 2011 – 2013.
- Member of the Faculty Senate, University of Notre Dame, 2010 – 2013.
- Chair of the Ph.D. oral candidacy examination board for: Tian Jiang (Jan 26, 2012), ACMS; Dong Lv (Mar 19, 2013), ACMS; Liang Wu (Mar 28, 2013), ACMS; Xiaozhi Zhu (Oct 1, 2018), ACMS; Zachary Miksis (Feb 5, 2019), ACMS; Ernie Tsybulnik (Feb 15, 2019), ACMS; Rentian Hu (April 13, 2022), ACMS.
- Chair of the ACMS-M.S. student oral candidacy examination board for: Fernando Garcia (Chemical and Biomolecular Engineering, March 20, 2014), Fanghui Fan (Chemical and Biomolecular Engineering, March 21, 2014).
- Member of the Ph.D. oral candidacy examination board for: Tatiana Kazakova (Nov 28, 2006), Department of Mathematics; Lioi Joshua (Jan 20, 2009), Department of Mathematics; Yuan Liu (Jan 27, 2009), Department of Mathematics; David Karapetyan (Feb 10, 2009), Department of Mathematics; Wenrui Hao (Feb 24, 2009), Department of Mathematics; Melissa Davidson (May 7, 2010), Department of Mathematics; Amy Buchmann (Mar 22, 2012), ACMS; Ryan Thompson (May 4, 2012), Mathematics; Steven Brus (April 27, 2015), Civil and Environmental Engineering; Kelsey DiPietro (Feb 18, 2016), ACMS; Oyekola Oyekole (Nov 3, 2016), ACMS; Daniel Howard (April 6, 2017), ACMS; Xinyue Zhao (Nov 17, 2017), ACMS; Anyastassia Seboldt (Feb 4, 2019), ACMS; Lin Xing (Oct 16, 2020), ACMS; Wenzheng Kuang (Mar 30, 2022), ACMS; Arjun Vijaywargiya (April 5, 2022), ACMS; Caroline Hills (November 9, 2022), ACMS; Xinyun Wang (March 31, 2023), Electrical Engineering.

- Chair / Co-Chair of the Ph.D. dissertation defense examination board for: Jianfeng Zhu (April 6, 2010), Department of Mathematics; Yuan Liu (Mar 28, 2012), ACMS; Tian Jiang (Mar 24, 2015), ACMS; Liang Wu (Mar 29, 2016), ACMS; Michael Machen (April 4, 2017), ACMS; Dong Lu (April 27, 2017), ACMS; Xiaozhi Zhu (May 12, 2021), ACMS; Zachary Miksis (June 22, 2022), ACMS; Ernie Tsybulnik (March 31, 2023), ACMS.
- Member of the Ph.D. dissertation defense examination board for: Matthew L. Rissler (May 2, 2008), Department of Mathematics; Richard Gejji (July 6, 2010), Department of Mathematics; David Karapetyan (Mar 1, 2012), Department of Mathematics; Melissa Davidson (Feb 26, 2013), Department of Mathematics; Wenrui Hao (June 25, 2013), ACMS; Chunlei Li (March 25, 2014), ACMS; Tim McCoy (July 9, 2014), ACMS; Ryan Thompson (Mar 3, 2015), Mathematics; Steven Brus (April 4, 2017), Civil and Environmental Engineering; Kelsey DiPietro (May 2, 2019), ACMS; Oyekola Oyekole (June 29, 2020), ACMS; Xinyue Zhao (May 28, 2021), ACMS; Xue Li (June 23, 2021), ACMS; Anyastassia Seboldt (April 19, 2022), ACMS.
- Member of the ACMS-M.S. student oral candidacy examination board for: Jing Zhao (June 10, 2013), Department of Chemical and Biomolecular Engineering; Xufei Wu (April 13, 2016), Aerospace and Mechanical Engineering; Francisco Huizar (Sep 14, 2022), Department of Chemical and Biomolecular Engineering; Aravind Baskar (November 16, 2022), Aerospace and Mechanical Engineering.
- Member of the Applied Math Master dissertation defense examination board for: Scott Christley (Nov 16, 2007), Department of Computer Science and Engineering; John Holmes (May 7, 2010), Department of Mathematics.
- Outside Chairperson of the Ph.D. candidacy examination board for: Sergio Almaraz (April 4, 2007), Department of Physics; Erin Hurley (April 17, 2008), Department of Chemistry and Biochemistry; David Flagel (April 14, 2011), Department of Biological Sciences.
- Outside Chairperson of the Ph.D. dissertation defense examination board for: Yilin Wu (March 27, 2009), Department of Physics.
- Member of the Ph.D. graduate student admissions panel (Department of Mathematics and ACMS), 2007 - Present.
- Writing and grading the Ph.D. candidacy written exams of Numerical Analysis for (1) Department of Mathematics, Jan 2008, August 2008, Jan 2009, May 2009, May 2010; (2) Department of Civil and Environmental Engineering and Earth Sciences, August 2012; (3) Department of Applied and Computational Mathematics and Statistics, 2017 - 2019; 2021.
- Abstract Reviewer for “the 1st Graduate Research Symposium, University of Notre Dame”, Nov. 21, 2008.
- Abstract Reviewer for “the 2nd Graduate Research Symposium, University of Notre Dame”, Jan. 22, 2010.
- First year advisor for Melissa Davidson (Mathematics), Ph.D. student, 2008-2009.
- AFFILIATED FACULTY of Environmental Fluid Dynamics at Notre Dame.
- AFFILIATED FACULTY of the Integrated Biomedical Sciences (IBMS) Graduate Program at the University of Notre Dame.

- Organizer / Co-Organizer of Mini-symposiums / Special Session in 7 academic conferences (see the page 9).
- Organizer / Co-Organizer of 3 academic conferences / workshops (see the page 9).
- Referee for total 51 professional Journals (see the page 8). I usually referee about 25 - 30 research papers every year.
- External Reviewer for: (1) a research proposal of Research Grants Council (RGC) in Hong Kong, China, 2011; (2) three proposals of RGC in 2012; (3) a research proposal of King Abdullah University of Science and Technology (KAUST), 2023.
- External Member of the Ph.D. dissertation committee for: Gang Li (May 2011); Wei Guo (May 2013); Xiaobo Yang (May 2013), Department of Mathematics, Nanjing University, China.
- Member of the Scientific Committee for: (1) “the second international workshop on Development and Application of High-Order Numerical Methods”, Xiamen, Fujian, China, May 18-21, 2013; (2) “the fifth international workshop on Development and Application of High-Order Numerical Methods”, Qingdao, China, August 9-12, 2023.
- Reviewer for Mathematical Reviews, American Mathematical Society, 2020 - Present.

### Developed new courses

- Graduate and Undergraduate cross listed course: “Numerical Linear Algebra”.
- Graduate course: “Topics in Applied Mathematics: High order accurate numerical methods for solving PDEs”.
- Undergraduate course: “Applied Linear Algebra”.
- Undergraduate course: “Topics in Applied Mathematics: Numerical methods for solving PDEs”.

### Students Advising

- Supervised Ph.D. Thesis
  - Dr. Jianfeng Zhu (Mathematics), Ph.D., May 2010. Thesis title: “Application of Discontinuous Galerkin Finite Element Methods for Vertebrate Limb Pattern Formation”. The job after Ph.D.: Analyst, Mendoza College of Business, University of Notre Dame. Current job: Manager, The Chinese Capital Market Statistics & Monitoring Center, Beijing, China.
  - Dr. Yuan Liu (Applied Mathematics), Ph.D., August 2012. Thesis title: “WENO Computations and Pattern Stability”. The job after Ph.D.: Visiting Assistant Professor, Department of Mathematics, Michigan State University. Current job: tenure track Assistant Professor, Department of Mathematics, Statistics and Physics, Wichita State University.
  - Dr. Tian Jiang (Applied Mathematics), Ph.D., May 2015. Thesis title: “Krylov Implicit Integration Factor WENO Methods for Stiff Advection-Diffusion-Reaction Equations”. The job after Ph.D. and current job: Quantitative Associate, Wells Fargo, New York.

- Dr. Liang Wu (Applied Mathematics), Ph.D., May 2016. Thesis title: “High Order Fast Iterative Methods for Steady State of Hyperbolic Partial Differential Equations”. The job after Ph.D. and current job: Associate in Quantitative Strategies department at Credit Suisse in New York, NY.
  - Dr. Michael Machen (Applied Mathematics), Ph.D., May 2017. Thesis title: “KRYLOV IMPLICIT INTEGRATION FACTOR METHODS FOR SOLVING FOURTH ORDER EQUATIONS”. The job after Ph.D. and current job: Quantitative Analyst, BMO Harris Bank, Chicago.
  - Dr. Dong Lu (Applied Mathematics), Ph.D., August 2017. Thesis title: “KRYLOV INTEGRATION FACTOR METHOD FOR HIGH SPATIAL DIMENSION CONVECTION-DIFFUSION PROBLEMS ON SPARSE GRIDS”.
  - Dr. Xiaozhi Zhu (Applied Mathematics), Ph.D., August 2021. Thesis title: “FAST SPARSE GRID SIMULATIONS OF FIFTH ORDER WENO SCHEME FOR HIGH DIMENSIONAL HYPERBOLIC PDES”. The job after Ph.D. and current job: Applied Scientist at Amazon based in Seattle.
  - Dr. Zachary Miksis (Applied Mathematics), Ph.D., August 2022. Thesis title: “Sparse-grid implementation of fixed-point fast sweeping WENO schemes for Eikonal equations”. The job after Ph.D. and current job: Postdoctoral research associate, University of Notre Dame; Research assistant professor, Temple University.
  - Dr. Ernie Tsybulnik (Applied Mathematics), Ph.D., May 2023. Thesis title: “EFFICIENT SPARSE-GRID IMPLEMENTATION OF A FIFTH-ORDER MULTI-RESOLUTION WENO SCHEME FOR HYPERBOLIC EQUATIONS”. The job after Ph.D. and current job: software engineer, Chronus Health, CA.
- Supervised M.S. Students
    - Yu Cao (Electrical Engineering), M.S. in Applied Mathematics, May 2010. Project title: “Study of Implicit Integration Factor Time Discretization for Chebyshev Spectral Method”. The job after graduation: Staff Scientist, Kopin Corporation Inc, Taunton, MA. Current job: Scientist, the HRL Lab, Los Angeles, CA. (HRL Lab is a semiconductor company.)
    - Fanghui Fan (Chemical and Biomolecular Engineering), M.S. in Applied Mathematics, May 2014. The job after graduation and current job: Consultant, Deloitte Consulting LLP, Washington DC.
  - Current graduate students
    - Rentian Hu (Applied Mathematics), Ph.D. student, 2021-Present.

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