Curriculum Vitae

Zhiliang Xu

Associate Professor
Department of Applied and Computational
 Mathematics and Statistics
University of Notre Dame
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Professional Preparation

B.S.   Beijing University of Aerospace and Astronautics, Mechanical Engineering, 1990 -1994
M.S.   Beijing University of Aerospace and Astronautics, Computer Graphics, 1994 -1997
Ph.D. State University of New York at Stony Brook, Computational Applied Mathematics, 1998-2002

Professional Appointments

- 08/2012 – present: Associate Professor, Department of Applied and Computational Mathematics and   Statistics, University of Notre Dame, Notre Dame, IN
- 07/2010 – 05/2012:   Assistant Professor, Applied and Computational Mathematics and Statistics Department, University of Notre Dame
- 08/2006 – 07/2010: Assistant Professor, Mathematics Department, University of Notre Dame
- 11/2004 – 08/2006:   Postdoctoral Research Associate, Computational Science Center, Brookhaven National Laboratory, **Advisor:** Professor James Glimm
- 2003 – 10/2004:   Postdoctoral Research Associate, Department of Applied Mathematics and Statistics, State University of New York at Stony Brook, **Advisor:** Professor James Glimm

Publications

[#]: graduate students
[$]: postdoctoral research associate
Refereed journal papers
   (Papers prior to coming to Notre Dame)

1. E. George, J. Glimm, X.-L. Li, A. Marchese, Z.-L. Xu*. A Comparison of experimental, theoretical, and numerical simulation Rayleigh-Taylor mixing rates. *Proceedings of the National Academy of Science USA*, 99(5):2587-2592, March 5, 2002.
2. J. Glimm, X.-L. Li, Y.-J. Liu, Z.-L. Xu*, N. Zhao. Conservative Front Tracking with Improved Accuracy. *SIAM J. of Numerical Analysis*, 41(5):1926-1947, 2003.
3. E. George, J. Glimm, X.L.Li, A. Marchese, Z.-L. Xu*, J.W.Grove, and D. Sharp. Numerical methods for the determination of mixing. *Laser and Particle Beams*, 21(3):437-442, 2003.
4. R. Samulyak, Y. Prykarpatskyy, T. Lu, J. Glimm, Z.-L. Xu*, M.N.Kim. Comparison of Heterogeneous and Homogenized Numerical Models of Cavitation. *International Journal for Multiscale Computational Engineering*, 4(3):377-390, 2006.

5. Z.-L. Xu*, M. Kim, T. Lu, W. Oh, J. Glimm, R. Samulyak, X.L. Li and C. Tzanos. <u>Discrete Bubble Modeling of Unsteady Cavitating Flow</u>. *International Journal for Multiscale Computational Engineering*, Issue 5-6, Vol 4, 2006.

(Papers since coming to Notre Dame)
6. R. Samulyak, J. Du, J. Glimm, Z.-L. Xu*. <u>A Numerical Algorithm for MHD of Free Surface Flows at Low Magnetic Reynolds Numbers</u>. *J. Comput. Phys.*, 226(2):1532-1549, 2007.
7. Z.-L. Xu*, J. Glimm, Y.M. Zhang, and X.F. Liu. <u>A Multiscale Front Tracking Method for Compressible Free Surface Flows</u>. *Chemical Engineering Science*, 62(13): 3538-3548, 2007.
8. T. Lu, Z.-L. Xu*, R. Samulyak, J. Glimm and X.M. Ji. <u>Dynamic Phase Boundaries for Compressible Fluids</u>. *SIAM J. on Scientific Computing*, 30(3): 895-915, 2008.
9. Z.-L. Xu*, N. Chen[$], M.M. Kamocka, E.D. Rosen, and M.S. Alber. <u>Multiscale Model of Thrombus Development</u>. *Journal of the Royal Society Interface*, 4(24): 705-723, 2008.
10. Z.-L. Xu*, N. Chen[$], S. Shadden, J. Marsden, M.M. Kamocka, E.D. Rosen and M. Alber. <u>Study of Blood Flow Effects on Growth of Thrombi Using a Multiscale Model</u>. *Soft Matter*, Vol 5: 769-779, 2009.
11. Z.-L. Xu*, Y.J. Liu, C.-W. Shu. <u>Hierarchical Reconstruction for Discontinuous Galerkin Methods on Unstructured Grids with WENO Type Linear Reconstruction</u>. *J. Comput. Phys.*, Vol 228:2194-2212, 2009.
12. Z.-L. Xu*, Y.J. Liu, C.-W. Shu. <u>Hierarchical Reconstruction for Spectral Volume Methods on Unstructured Grids</u>. *J. Computat. Phys.*, 228(16):5787-5802, 2009.
13. Y.J. Liu, C.-W. Shu and Z.-L. Xu*. <u>Hierarchical Reconstruction with up to Second Degree Remainder for Solving Nonlinear Conservation Laws</u>. *Nonlinearity*, 22:2799-2812, 2009.
14. Z.-L. Xu*, G. Lin. <u>Spectral/hp element method with hierarchical reconstruction for solving nonlinear hyperbolic conservation laws</u>. *Acta Mathematica Scientia*, 29(B):1737-1748, 2009.
15. J. Mu[#], X.M. Liu[#], M.M. Kamocka, Z.-L. Xu*, M.S. Alber, E.D. Rosen, D.Z. Chen. <u>Segmentation, Reconstruction, and Analysis of Blood Thrombus Formation in 3D 2-Photon Microscopy Images</u>. *EURASIP JOURNAL ON ADVANCES IN SIGNAL PROCESSING*, 2010:8:1-8:1, 2010.
16. M.M. Kamocka, J. Mu[#], X. Liu[#], N. Chen[$], A. Zollman, B. Sturonas-Brown, K. Dunn, Z.-L. Xu*, D.Z. Chen, M.S. Alber, E.D. Rosen. <u>Two-photon intravital imaging of thrombus development</u>. *J Biomed Opt*. 15(1):016020, 2010.
17. Z.-L. Xu*, J. Lioi[#1], J. Mu[#], M.M. Kamocka, X. Liu[#], D.Z. Chen, E.D. Rosen, and M.S. Alber. <u>A Multiscale Model of Venous Thrombus Formation with Surface-Mediated Control of Blood Coagulation Cascade</u>. *Biophysical Journal*, 98(9):1723-1732, 2010.
18. C.R. Sweet[$], S. Chatterjee[#], Z.-L. Xu*, K. Bisordi, E.D. Rosen, and M. Alber. <u>Modeling Platelet-Blood Flow Interaction Using Subcellular Element Langevin Method</u>. *Journal of the Royal Society Interface*, Doi:10.1098/rsif.2011.0180, 2011.
19. E. Kim[$], O.V. Kim[$], K.R. Machlus[#], X. Liu[#], T. Kupaev[#], J. Lioi[#1], A.S. Wolberg, D.Z. Chen, E.D. Rosen, Z.-L. Xu* and M. Alber. <u>Correlation between fibrin network structure and mechanical properties: an experimental and computational analysis</u>. *Soft Matter*, 7:4983-4992, 2011.
20. Z.-L. Xu*, M. Kamocka, M. Alber and E. Rosen. <u>Computational Approaches to Studying Thrombus Development</u>. *Arterioscler Thromb Vasc Biol.*, 31:500-505, 2011.
21. H. Du[#1], Z.-L. Xu*, J. Shrout, M. Alber. <u>Multiscale Modeling of Pseudomonas Aeruginosa Swarming</u>. *Math. Models and Methods in App. Sci.* 21(Suppl.) 939-954, 2011.

22. Z.-L. Xu*, Y. Liu, H. Du[#1], G. Lin and C.-W. Shu. <u>Point-wise Hierarchical Reconstruction for Discontinuous Galerkin and Finite Volume Methods for Solving Conservation Laws</u>. *J. of Comput. Phys.*, 230(17):6843-6865, 2011.

23. Z.-L. Xu*, O. Kim[$], M. Kamocka, E.D. Rosen and M. Alber. <u>Multiscale models of thrombogenesis</u>. *WIREs Sys. Biol. Med.*, doi:10.1002/wsbm.1160, 2012.

24. H. Du[#1], Z.-L. Xu*, M. Anyan[#], O. Kim[$], W.M. Leevy, J. Shrout and M. Alber. <u>High Density Waves of the Bacterium Pseudomonas aeruginosa in Propagation Swarms Result in Efficient Colonization of Surfaces</u>. *Biophysical Journal*, 103:601-609, 2012.

25. C.W. Harvey[#], H. Du[#1], Z.-L. Xu*, D. Kaiser, I. Aranson and M. Alber. <u>Interconnected Cavernous Structure of Bacterial Fruiting Bodies</u>. *PLOS Computational Biology*, 8(12):e1002850, 2012.

26. Oleg V. Kim[$], Zhiliang Xu*, Elliot D. Rosen, Mark S. Alber. <u>Fibrin Networks Regulate Protein Transport during Thrombus Development</u>. *PLOS Computational Biology*, 9(6):e1003095, 2013.

27. W. Hao[#], J.D. Hauenstein, C.-W. Shu, A.J. Sommese, Z.-L. Xu* and Y.T. Zhang. <u>A homotopy method based on WENO schemes for solving steady state problems of hyperbolic conservation laws</u>. *J. Comput. Phys.,* 250:332-346, 2013.

28. D.S. Balsara, C. Meyer, M. Dumbser, H. Du[#1], and Z.L. Xu*. <u>Efficient implementation of ADER schemes for Euler and magnetohydrodynamical flows on structured meshes - Speed comparisons with Runge-Kutta methods</u>. *J. Comput. Phys.,* 235: 934-969, 2013.

29. Z. Wu[$], Zhiliang Xu*, Oleg Kim[$], and Mark Alber. <u>Three-dimensional Model of Deformable Platelets Adhesion to Vessel Wall in Blood Flow</u>. *Phil. Trans. R. Soc. A*, 372(2021) 2014.

30. Z.-L. Xu*, X.-Y. Cheng, Y. Liu. <u>A new Runge–Kutta discontinuous Galerkin method with conservation constraint to improve CFL condition for solving conservation laws</u>. *J. Comput. Phys.,* 278:348-377, 2014. DOI: 10.1016/j.jcp.2014.08.042.

31. W. Hao[#], Z.-L. Xu*, C. Liu, G. Lin. <u>A Fictitious Domain Method with a Hybrid Cell Model for Simulating Motion of Cells in Fluid Flow</u>. *J. Comput. Phys.*, 280: 345 – 362, 2015, DOI: 10.1016/j.jcp.2014.09.020.

32. G. Tierra[$], J.P. Pavissich[#], R. Nerenberg, Z.L. Xu*, M. Alber. <u>Multicomponent model of deformation and detachment of a biofilm under fluid flow</u>. *J. R. Soc. Interface*, 12:20150045, 2015.

33. Z.L. Xu*, D.S. Balsara, H. Du[#1]. <u>Divergence-Free WENO Reconstruction-Based Finite Volume Scheme for Solving Ideal MHD Equations on Triangular Meshes</u>. *Comm. in Comput. Phys.*, 19(4): 841-880, 2016.

34. Z.L. Xu*, Y.J. Liu. <u>New Central and Central Discontinuous Galerkin Schemes on Overlapping Cells of Unstructured Grids for Solving Ideal Magnetohydrodynamic Equations with Globally Divergence-Free Magnetic Field</u>. *J. Comput. Phys.*, 327:203-224, 2016.

35. A. Nematbakhsha[$1], W. Sun[#1], P.A. Brodskiy[$], A. Amiri[#], C. Narciso[#], Z.L. Xu*, J.J. Zartman, M. Alber. <u>Multi-scale computational study of the mechanical regulation of cell mitotic rounding in epithelia</u>. *PLOS Comput. Bio.,* 13(5): e1005533 2017.

36. Peter Höök[$1], R.I. Litvinov, O.V. Kim[$], S. Xu[$1], Zhiliang Xu*, J.S. Bennett, M.S. Alber. J.W. Weisel. <u>Strong Binding of Platelet Integrin αIIbβ3 to Fibrin Clots: Potential Target to Destabilize Thrombi</u>. *Scientific Reports*, 7, 13001, 2017.

37. S. Xu[$1], Z.L. Xu*, O. Kim[$], R.I. Litvinov, J.W. Weisel, M. Alber. <u>Model Predictions of Deformation, Embolization, and Permeability of Partially Obstructive Blood Clots under Variable Shear Flow</u>. *Journal of the Royal Society interface*, 14(136), pii: 20170441, 2017.

38. S. Xu$^\$$, M. Alber, Z.L. Xu*. <u>Three-phase Model of Visco-elastic Incompressible Fluid Flow and its Computational Implementation</u>. *Comm. Comput. Phys.,* 25(2):586-624, 2019.

39. S. Britton$^\#$, O. Kim$^\$$, F. Pancaldi$^\$$, Z.L. Xu*, R. Litvinov, J.W. Weisel, M. Alber. <u>Contribution of Nascent Cohesive Fiber-Fiber Interactions to the Non-Linear Elasticity of Fibrin Networks under Tensile Load</u>. *Acta Biomaterialia,* 94:514-523 https://doi.org/10.1016/j.actbio.2019.05.068, 2019 (accepted)

40. H. Du, Y.J. Liu, Y. Liu, Z.L. Xu. <u>Well-balanced discontinuous Galerkin method for shallow water equations with constant subtraction techniques on unstructured meshes</u>. 2019, J. Sci. Comput. (accepted)

Papers in refereed proceedings and book chapters
(Papers prior to coming to Notre Dame

1. E. George, J. Glimm, J. W. Grove, X.-L. Li, A. Marchese, D. Sharp, and Z.-L. Xu*. <u>Numerical Methods for Determination of Rayleigh-Taylor Mixing</u>. *Proceedings of Mix01*.

2. E. George, J. Glimm, J. W. Grove, X.-L. Li, Y.-J. Liu, Z.-L. Xu and N. Zhao. <u>Simplification, Conservation and Adaptivity in the Front Tracking Method</u>. *The Proceedings of Ninth International Conference on Hyperbolic Problems*, Hyp2002.

3. J. Glimm and J. W. Grove and X. L. Li and Yingjie Liu and Zhiliang Xu. <u>Unstructured grids in 3D and 4D for time-dependent interface in front tracking with improved accuracy</u>. *Proc. 8th Int. Conf. Num. Grid Generation in Comp. Field Simulations*. 179-188, 2002.

4. J. Glimm, X.-L. Li, Z.-L. Xu. <u>Front Tracking Algorithm Using Adaptively Refined Meshes</u>. Proceedings of the 2003 Chicago Workshop on Adaptive Mesh Refinement Methods, Adaptive Mesh Refinement - Theory and Applications, the Lecture Notes in Computational Science and Engineering, ISSN: 1439-7358.

5. E. George, J. Glimm, J. W. Grove, X. L. Li, Y. J. Liu, Z. L. Xu* and N. Zhao. <u>Simplification, Conservation and Adaptivity in the Front Tracking Method</u>. Hyperbolic Problems: Theory, Numerics and Applications, Proceedings of the ninth international conference on hyperbolic problems held in CalTech, Pasadena, March 25-29, 2002, Edited by T. Hou and E. Tadmor, pp. 175-184, ISBN 3-540-44333-9 Springer-Verlag, Berlin Heidelberg New York, 2003.

6. James Glimm, M.-N. Kim, X.-L. Li, R. Samulyak and Z.-L. Xu*. <u>Jet Simulation in a Diesel Engine</u>. Computational Fluid and Solid Mechanics: Proceedings, third MIT Conference on Computational Fluid and Solid Mechanics, Vol. 1, pp. 646, June 14-17, 2005.

7. B. Fix, J. Glimm, X.-L. Li, Y. Li, X.F. Liu, R. Samulyak, Z.-L. Xu*. <u>A TSTT integrated FronTier code and its application in computational fluid physics</u>. *J. of Phys: Conference Series* 16:471-475, 2005.

8. J. Glimm, X. L. Li, Y. H. Li, and Z.-L. Xu*. <u>An Enhanced Front Tracking Method for Computation of Discontinuous Structures in Fluid Dynamics</u>. Proceedings of WCCM-6, Computational Mechanics, WCCM VI in conjunction with APCOM'04, Sept. 5-10, 2004, Beijing, China, Edited by Z. H. Yao, M. W. Yuan and W. X. Zhong, Tsinghua University & Springer-Vrelag, pp. 340-344, 2004.

9. J. Glimm, B. Fix, X.-L. Li, J.J. Liu, X.F. Liu, T. Lu, R. Samulyak and Z.L. Xu. <u>Front Tracking under TSTT</u>. Numerical Modeling of Space Plasma Flows: ASP Conference Series, 359:15-24, 2006.

(Papers since coming to Notre Dame)

10. Z.-L. Xu*, J. Lioi, J. Mu, X. Liu, D.Z. Chen, M.M. Kamocka, E.D. Rosen and M.S. Alber. <u>Combined Experimental and Simulation Study of Blood Clot Formation</u>. *Proceedings of the IEEE TIC-STH-SENCS*, Sep 26-27, 2009, Toronto, Canada. (Times Cited: 3)

11. J. Mu, X. Liu, M.M. Kamocka, Z.-L. Xu*, M.S. Alber, E.D. Rosen, and D.Z. Chen. <u>Segmentation, Reconstruction, and Analysis of Blood Thrombi in 2-Photon Microscopy Images</u>. Proceedings of 22nd IEEE Symposium on Computer-Based Medical Systems (CBMS), Albuquerque, New Mexico, August 3-4, 2009.

12. Z.-L. Xu*, S. Christley, J. Lioi, C. Harvey, W. Sun, E.D. Rosen and M. Alber. <u>Multiscale Modeling of Fibrin Accumulation on Thrombus Surface and Platelet Dynamics</u>. Special Volume in Computational Method in Cell Biology, edited by A. Asthagiri and A. Arkin, DOI 10.1016/B978-0-12-394620-1.00014-X, 2012. (Times Cited: 18)

13. X. Liu, J. Mu, K.R. Machlus, A.S. Wolberg, E.D. Rosen, Z. Xu*, M.S. Alber, and D.Z. Chen. <u>Automatic Segmentation and Analysis of Fibrin Networks in 3D Confocal Microscopy Images</u>. the *SPIE International Symposium on Medical Imaging: Imaging Processing*, DOI: 10.1117/12.911712, March 2012

Research Support

Ongoing Research Support:
1. Project/Proposal Title: CDS&E-MSS: Collaborative Research: Design and Analysis of High-Order Accurate Mul-tiscale Schemes and Simulation Toolkit for electromagnetohydrodynamic Flow. Source of Support: NSF- 1821242. Total Award Amount: $100,000.00 Total Award Period Covered: 09/01/2018-08/31/2019 *(this grant is extended for another year without cost)*

2. Project/Proposal Title: CDS&E-MSS: Geometric and Statistical Foundations for Modeling Cell Shapes. Source of Support: NSF CDS&E-MSS 1854779. PI (Lizhen Li). Co-PI (Xu). Total Award mount: $287,937.00. Total Award Period Covered: 07/15/2019-07/16/2022

Past Research Support:
1. Northwest Indiana Computational Grid (NWICG) project, $25,000, 10/01/08-09/30/09, PI

2. Source and Project number: NSF DMS-0800612
   Title of Project: Integrating Multiscale Modeling and in vivo Experiments for Studying Blood Clot Development. 09/01/08-09/01/11 (this grant is extended for another year without cost), $864,000, PI. Alber; Co-PIs: Yi Jiang, Zhiliang Xu.
   Role: Xu will develop new multiscale mathematical and computational approaches for studying blood clot formation.

3. Source and Project Number: NIH 1 R01 GM100470-01
   Title of Project: Study of the interplay of motility mechanisms during swarming of Myxococcus xanthus. $779,565, 09/01/11-06/01/15, PI: Mark Alber; Co-PIs: Danny Chan (computer scientist, image analysis), Joshua Shrout(microbiologist), Zhiliang Xu.
   Role: Dr. Xu will develop new biochemical reaction sub-model and elastic submodel for modeling Myxo bacterum.

4. Source and Project Number: NSF DMS-1115887
   Title of Project: High Order Model, Computation, and Stochastic Hybrid Coupling Continuum-Particle Algorithm with Application to to Micro-Propulsion. 10/01/11-09/30/15,

$120,000, PI: Zhiliang Xu; Co-PI: Guang Lin (Uncertainty quantification, $28,791 requested for Lin).

Role: Xu will supervise on the progress of the project, and will develop new discontinuous Galerkin type schemes for solving Euler and MHD equations. Xu will also develop stochastic hybrid coupling method in collaboration with Lin.

5. Source and Project Number: NIH: 1 R01 GM095959-01A1
   Title of Project: Combined multiscale modeling and experimental study of bacterial swarming. $1,867,500, 04/01/2012 - 12/31/2016, 4 years, PI: Mark Alber; Co-PIs: Danny Chen(computer scientist, image analysis), Joshua Shrout(microbiologist), Zhiliang Xu.
   Role: Xu will develop new thin liquid film sub-model and biochemical reaction su-bmodel for modeling P. aeruginosa swarming.

6. Source and Project Number: NIH: IU01HL116330-01A1
   Title of Project: Multiscale modeling and empirical study of a mechanism limiting blood clot growth.   Start Date: July 25, 2014   End Date: June 30, 2019 Award Amount: $751,593.00 (year one). Total: $3,550,000. PI: Mark Alber; Co-PIs: Danny Chen, Holly Goodson, Zhiliang Xu and Oleg Kim.

7. Source and Project Number: NSF: DMS-1517293
   Title: Collaborative Research: Multiscale Modeling and Experimental Study of Blood Cell Interactions with Application to Functionalized Leukocytes Killing Cancer Cells. Start Date: Sept 01, 2015 End Date: Aug 31, 2018 (*this grant is extended for another year without cost*) Award Amount: $180,000.00. PI: Zhiliang Xu

Presentations since coming to Notre Dame
(Colloquium since coming to Notre Dame)

1. **Invited Talk.** "An Operator Splitting Scheme for Solving Fluid and Massive Interface Interaction Problem", ICIAM2019, Valencia, Spain, 15th – 19th July 2019.
2. **Invited Talk.** "Local Discontinuous Galerkin Methods for Solving Time-dependent Equations on Manifolds", Midwest Numerical Analysis Day, IIT, 04/20/2019.
3. **Invited talk.** "Central Schemes and LDG on manifolds", Department of Mathematics and Statistics, Wichita State University, 04/05/2019.
4. **Invited Talk.** AMS Special Session on Numerical Methods for PDEs and Applications. Joint Mathematics Meeting 2019. 01/16/2019
5. **Short course Lecture**. "**NCTS Minicourse of Mathematical Physiology**". Mathematics Division, National Center for Theoretical Sciences, National Taiwan University, December 17-31, 2017.
6. **Invited talk.** "New Central and Central Discontinuous Galerkin Schemes on Overlapping Cells of Unstructured Grids for Solving Ideal Magnetohydrodynamic Equations with Globally Divergence-Free Magnetic Field", Fluid Mechanics and Waves Seminar, Department of Mathematics, NJIT, 12/04/2017
7. **Invited talk.** "New Central and Central Discontinuous Galerkin Schemes on Overlapping Cells of Unstructured Grids for Solving Ideal Magnetohydrodynamic Equations with Globally Divergence-Free Magnetic Field", Applied Math Seminar, School of Mathematics, Georgia Institute of Technology, 11/27/2017
8. **Invited talk.** "Microscale and Macroscale Models for Blood Cell Circulation and Blood Clotting", Workshop on Mathematical Approaches to Interfacial Dynamics in Complex Fluids,

Banff International Research Station for Mathematical Innovation and Discovery. Banff, Canada, June 25, June 30, 2017.

9. **Invited talk.** "Thermodynamically Consistent Sharp Interface Model and Phase Field Modeling for Blood Clotting", 5th International Conference on Computational and Mathematical Biomedical Engineering, CMBE2017. Pittsburgh, PA, 2017.

10. **Poster presentation**. "Multi-scale models of Blood Clotting", IMAG 10th Anniversary Multiscale Modeling Consortium Meeting, NIH, Bethesda, MD, Mar 22 – Mar 24, 2017.

11. **Invited talk**. "Thermodynamically Consistent Sharp Interface Model and Stable Splitting Method for Interaction between Fluid and Interface with Mass". SIAM Conference on Comput. Sci. & Eng., Feb 27 – Mar 3, 2017

12. **Applied math seminar**. "Computational Modeling in Studying Blood Clot Formation", Department of Mathematics, Michigan State University, Nov. 18, 2016.

13. **Invited talk**. "Multiscale Models of Blood Clot Formation " MiA 2016: Modeling and analysis in molecular biology and electrophysiology. Suzhou, China, June 16-18, 2016

14. **Colloquium**. "Multiscale Models of Blood Clot Formation and Biofilm-Fluid Interaction", Department of Mathematical Sciences, IUPUI, Mar 25, 2016

15. **Colloquium**. "Multiscale Models of Blood Clot Formation and Biofilm-Fluid Interaction", Department of Mathematics and Statistics, GSU, Feb 26, 2016

16. **Invited Talk**. "Multiscale Model of Blood Cell-Vessel Wall Interaction in Blood Flow", ICIAM 2015, Beijing, China, August 10-14, 2015

17. **Invited Talk**. "An energetic variational approach to model interaction of multicomponent biofilms with fluid flows", ICIAM 2015, Beijing, China, August 10-14, 2015

18. **Invited Talk**. "Modeling Blood Cell-Substrate Interaction and Biofilm-Fluid Interaction", IMAH Hot Topics Workshop, Mathematics of Biological Charge Transport: Molecules and Beyond, July 20 – 24, 2015

19. **Keynote speaker**. "RKDG method with conservation constraints and hierarchical reconstruction limiter for solving conservation laws", The Sixth International Symposium on Physics of Fluids (ISPF6) 07/06-07/09, 2015 Xining, China

20. **Colloquium.** "A RKDG method with conservation constraints to improve CFL conditions for solving conservation laws & an energetic variational approach to model biofilm", Applied Math Seminar, Department of Mathematics, OSU, Apr 30, 2015

21. **Colloquium.** "A RKDG method with conservation constraints to improve CFL conditions for solving conservation laws & an energetic variational approach to model biofilm", Computational & Applied Math Seminar, Department of Mathematics, Purdue University, Apr 06, 2015

22. **Invited talk.** "A RKDG method with conservation constraints to improve CFL conditions for solving conservation laws", 1st Annual Meeting of SIAM Central States Section, Missouri University of Science and Technology, Apr 11-12, 2015

23. **Invited talk.** "A new RKDG method with conservation constraints to improve CFL conditions for solving conservation laws", 2015 SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah, Mar 14-18, 2015

24. **Invited talk.** "A Fictitious Domain Method with a Hybrid Cell Model for Simulating Motion of Cells in Fluid Flow", 2015 SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah, Mar 14-18, 2015

25. **Colloquium.** "Modeling Blood Cell-Substrate Interaction and Biofilm-Fluid Interaction", Department of Mathematics, Penn State University, State College, Jan 26, 2015
26. **Colloquium.** "Modeling Blood Clot Formation", School of Mathematical Science, School of Mathematical Sciences, The University of Nottingham, Ningbo, China, June 10, 2014
27. **Colloquium.** "Modeling of Blood Clot Formation", College of Aerospace Engineering, NUAA, Nanjing, June 6, 2014
28. **Invited talk.** "Modeling of Blood Clot Formation", Workshop of Mathematics in Action: Modeling and analysis in molecular biology and electrophysiology   Suzhou, June 2-5, 2014
29. **Invited talk.** "A New Runge-Kutta Discontinuous Galerkin Method with Conservation Constraint to Improve CFL Condition for Solving Conservation Laws", Dept. of Mathematical Sciences, University of Wisconsin-Milwaukee, MWNADAY2014, May 3, 2014
30. **Invited talk.** "Multiscale Modeling of Blood Clot Formation", Society for Mathematical Biology., 2012 Annual Society for Mathematical Biology Conference, 07/27/2012
31. **Invited talk.** "Pseudomonas aeruginosa Cells Alter Environment to Efficiently Colonize Surfaces Using Fluid Dynamics", 2012 Annual Society for Mathematical Biology Conference, 07/27/2012
32. **Colloquium.** "Multiscale modeling of P. aerugenosa swarming", Z.-L. Xu, Mathematics Department, Central Michigan University, Oct. 20, 2011.
33. **Colloquium.** "Conservation Constrained Runge-Kutta Discontinuous Galerkin Method with Improved CFL Condition for Conservation Laws", Z.-L. Xu, Mathematics and Statistics Department, Wichita State University, Mar. 26, 2010.
34. **Colloquium**. "Hierarchical reconstruction for discontinuous Galerkin methods for hyperbolic conservation laws and constraint DG", Z.-L. Xu, Applied Mathematics Department, IIT at Chicago, Nov. 17, 2009.
35. **Colloquium**. "Hierarchical reconstruction for spectral volume and RKDG methods", Z.-L. Xu, Department of Mathematics, UT at Arlington, May 8, 2009.
36. **Colloquium**. "Hierarchical reconstruction for spectral volume and RKDG methods for solving hyperbolic conservation laws", Z.-L. Xu, Department of Applied Mathematics, SUNY at Stony Brook, Mar 11, 2009.
37. **Colloquium**. "Hierarchical reconstruction for spectral volume and RKDG methods for solving hyperbolic conservation laws", Z.-L. Xu, Department of Aerospace Engineering, Iowa State University, Feb 24, 2009.

(Invited talk since coming to Notre Dame)
1. **Invited talk**. "A New Runge-Kutta Discontinuous Galerkin Method with Conservation Constraint to Improve CFL Condition for Solving Conservation Laws", Numerical Analysis day 2014. Department of Mathematical Sciences, University of Wisconsin-Milwaukee May 3, 2014
2. **Invited talk.** "Three-dimensional Multiscale Model of Deformable Platelets Adhesion to Vessel Wall in Blood Flow", Mathematics in Action: Modeling and analysis in molecular biology and electrophysiology, School of Mathematical Science, Soochow University, Suzhou, China, June 2-5, 2014
3. **Invited talk.** "Multiscale Modeling of Blood Clot Formation", Z.-L. Xu, 2012 Annual Society for Mathematical Biology Conference, Knoxville Convention Center, TN, July 25-28, 2012.
4. **Invited talk.** "Pseudomonas aeruginosa Cells Alter Environment to Efficiently Colonize Surfaces Using Fluid Dynamics", H. Du, Z.-L. Xu, O. Kim, M. Alber, 2012 Annual Society for Mathematical Biology Conference, Knoxville Convention Center, TN, July 25-28, 2012.

5. **Invited talk.** **"**A divergence-free reconstruction approach for magnetic field for solving MHD equations on unstructured meshes**",** Z.-L. Xu, 2011 International Congress on Industrial and Applied Mathematics (ICIAM 2011), Vancouver, BC, Canada, July 18 – 22, 2011.

6. **Invited talk.** **"**A RKDG method with conservation constraints to improve CFL conditions for solving conservation laws**",** Z.-L. Xu, 2011 International Congress on Industrial and Applied Mathematics (ICIAM 2011), Vancouver, BC, Canada, July 18 – 22, 2011.

7. **Invited talk.** "WENO divergence-free reconstruction-based finite volume scheme for solving ideal MHD equations on triangular meshes", Z.-L. Xu, Midwest Numerical Analysis Day 2011, Purdue University, May 7-8, 2011.

8. **Invited talk.** "A conservation constrained discontinuous Galerkin method with improved CFL number for conservation laws", Z.-L. Xu, 2010 SIAM Annual Meeting, Pittsburgh, 2010.

9. **Invited talk.** "Computational Study of Complex Biological Systems", Z.-L. Xu, International Conference series on Computational and Mathematical Methods in Science and Engineering, Department of Mathematics, University of Wisconsin-Madison, Madison, Wisconsin, May 24-26, 2010.

10. **Invited talk.** "Computational Study of Biological Systems Involving Fluid Flow", Z.-L. Xu, Workshop on Discrete Differential Geometry For Multiphase Problems, IUPUI, Apr. 23-24, 2010.

11. **Invited talk.** **"**Hierarchical reconstruction for spectral volume method and RKDG method**",** Z.-L. Xu, Y. Liu, C.-W. Shu, 10th US National Congress on Computational Mechanics, Columbus, Ohio, July 16-19, 2009.

12. **Invited talk.** "A Multiscale Model of Thrombus Development", Xu, Z.L., Chen, N., Kamocka, M.M., Rosen, E.D., and M.S. Alber, SIAM Conference on Life Sciences, Montreal, Quebec Canada, Aug 4-7, 2008.

13. **Invited talk.** "Hierarchical Reconstruction for Discontinuous Galerkin Methods on Unstructured Grids with a Weno Type Linear Reconstruction", Z.-L. Xu, SIAM 2008 annual meeting, San Diego, CA, July 7-11, 2008.

14. **Invited talk.** "A Computational Multiscale Model of Blood Clot Development", Z.-L. Xu, N. Chen, M.M. Kamocka, E.D. Rosen and M.S. Alber, Mathematical Tools for Multi-Scale Biological Processes conference, Montana State Univ., Bozeman, June 4-6, 2008.

15. **Invited talk**. "A Computational Multiscale Model of Blood Clot Development", Z.-L. Xu, N. Chen, M.M. Kamocka, E.D. Rosen and M.S. Alber, AMS Spring Central Section Meeting, Indiana Univ., Bloomington, April 5-6, 2008.

16. **Invited talk.** "Non-Oscillatory Hierarchical Reconstruction for Discontinuous Galerkin Methods on unstructured Meshes", Z.-L. Xu, Yingjie Liu, The 9th U.S. National Congress on Computational Mechanics, San Francisco, CA, July-23-26, 2007.

17. **Invited talk.** "A N-Dimensional Conservative Front-Tracking Method", Z.-L. Xu, Yingjie Liu, Xiaolin Li, Jingjie Liu James Glimm, 2007 SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, Feb 19-23, 2007.

 (Contributed talk since coming to Notre Dame)
1. **Contributed talk.** "Discrete Bubble Modeling of Unsteady Cavitating Flow", Z.-L. Xu, Roman Samulyak, James Glimm and Xiaolin Li, ASME 2nd Joint U.S.-European Fluids Engineering Summer Meeting, Miami, FL, July 17-20, 2006.

2. **Poster.** M.M. Kamocka, F. Qi, Z.-L. Xu*, N. Chen, M. Alber and E.D. Rosen, "Testing the multiscale computational ToolKit for modeling thrombus development using near real-time

confocal imaging of mesenteric vascular injury", Arteriosclerosis Thrombosis and Vascular Biology, 27(6):E108-E108, 2008, Annual Conference on Arteriosclerosis, Thrombosis, and Vascular Biology, Chicago, IL, APR 19-21, 2007.

3. **Poster.** M.M. Kamocka, N. Chen, Z.-L. Xu*, A.L. Zollman, M. Alber and E.D. Rosen, "2-photon intravital imaging and computational modeling of thrombus development in vivo", Arteriosclerosis Thrombosis and Vascular Biology, 28(6):E68-E68, 2008, 9th Annual Conference on Arteriosclerosis, Thrombosis and Vascular Biology, Atlanta, GA, APR 16-18, 2008.

Presentations prior to coming to Notre Dame

(Colloquium prior to coming to Notre Dame)

1. **Colloquium.** Department of Mathematics, University of Notre Dame, Notre Dame, IN, Jan 24, 2006.
2. **Colloquium.** Department of Mathematics, University of Alabama, Tuscaloosa, AL, Feb. 2006.

(Contributed talk prior to coming to Notre Dame)

1. **Contributed talk.** "Direct Numerical Simulations of Atomization of a High Speed Jet", Z.-L. Xu, M. Kim, W. Oh, J. Glimm and X.-L. Li, 18th Annual Conference on Liquid Atomization and Spray Systems, Irvine, CA, May, 2005.
2. **Contributed talk.** "Jet Simulation in a Diesel Engine", Z.-L. Xu, J. Glimm and X.-L. Li, APS March Meeting, Los Angeles, CA, March, 2005.
3. **Contributed talk.** "The Conservative Front Tracking in Cylindrical Geometry", Z.-L. Xu, J. Glimm and X.-L. Li, SIAM Annual Meeting, Portland, Oregon, July 12-16, 2004.
4. **Contributed talk.** "A Parallel Implementation of Adaptive Front Tracking", Z.-L. Xu, J. Glimm and X.-L. Li, SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, CA, Feb.25-27, 2004.
5. **Poster presentation.** "A Parallel Implementation of Adaptive Front Tracking", Z.-L. Xu, J. Glimm and X.-L. Li, Chicago Workshop on Adaptive Mesh Refinement Methods. University of Chicago, IL, Sept. 3-5, 2003.
6. **Contributed talk.** "Conservative Front Tracking Algorithm in Two Dimensions", Z.-L. Xu, J. Glimm and X.-L. Li, 9th International Workshop on Numerical Methods for Free Boundary Problems, College Park, Maryland, January 9-12, 2002.
7. **Contributed talk.** "Conservative Front Tracking Algorithm in Two Dimensions", Z.-L. Xu, J. Glimm, X.-L. Li and Y.-J. Liu, SIAM 50, Philadelphia, July 8-12, 2002.
8. **Contributed talk.** "A New Front Tracking Method for Richmyer-Meshkov Instability", Z.-L. Xu, J. Glimm, X.-L. Li and Y.-J. Liu, International Workshop on Computational Methods for Continuum Physics and Their Applications, Nanjing, China, May 21-24, 2001.

Conferences organized

1. **Minisymposium organizer**. "Advances in computation and analysis of PDE's for multiphase system", ICIAM2019, Valencia, Spain, 15th – 19th July 2019. Organizers: Xiaolin Li, Zhiliang Xu
2. **Minisymposium organizer**. "Recent Advances in Modelling, Computational PDEs & their Applications", 5th International Conference on Computational & Mathematical Biomedical Engineering (CMBE17), Pittsburgh, PA, 10th – 12th April 2017. Organizers: Zhiliang Xu, Martina Bukac

3. **Co-organizer.** "Midwest Numerical Analysis Day Conference", Applied and Computational Mathematics and Statistics Department, Notre Dame, May 12 – 13, 2012. Organizers: Mark Alber, Bei Hu, Andrew Sommese, Gretar Tryggvason, Joannes Westerink, Zhiliang Xu and Yongtao Zhang.

4. **Minisymposium organizer.** **"**Numerical Methods for Complex Flows**",** 2011 International Congress on Industrial and Applied Mathematics (ICIAM 2011), Vancouver, BC, Canada, July 18 – 22, 2011. Organizers: Guang Lin, Zhiliang Xu, Yingjie Liu

5. **Minisymposium organizer. "**Special Session on Mathematical Modeling and Computation with Applications in Biology**",** 2010 AMS Fall Central Section Meeting, Notre Dame, IN, November 5-7, 2010. Organizers: Mark Alber, Zhiliang Xu

6. **Minisymposium organizer.** "Advanced Computational Methods for Convection Dominated Flow Problems", 2010 SIAM Annual Meeting, Pittsburgh, 2010. Organizers: Zhiliang Xu, John W. Grove, Yingjie Liu

7. **Minisymposium organizer. "**Numerical methods for PDEs and their applications**",** 10th US National Congress on Computational Mechanics, Columbus, Ohio, July 16-19, 2009. Organizers: Zhiliang Xu, Yingjie Liu

Teaching

Courses taught since coming to Notre Dame
Spring 2019, graduate course, ACMS60790 "Numerical Analysis II"
Fall 2018, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Fall 2018, graduate course, ACMS60690 "Numerical Analysis I"
Spring 2017, graduate course, ACMS60790 "Numerical Analysis II"
Fall 2016, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2016, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Fall 2015, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2015, graduate course, ACMS60790 "Numerical Analysis II"
Spring 2015, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Fall 2014, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2014, graduate course, ACMS60790 "Numerical Analysis II"
Spring 2014, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Fall 2013, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2013, graduate course, ACMS60790 "Numerical Analysis II"
Spring 2013, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Fall 2012, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2012, cross-listed course, ACMS40212/60212 "Advanced Scientific Computing"
Spring 2012, undergraduate course, ACMS40390 "Numerical Analysis"
Fall 2011, undergraduate course, ACMS40390 "Numerical Analysis"
Spring 2011, undergraduate course, Math20580 "Linear Algebra and Differential equations"
Spring 2011, graduate course, ACMS60790 "Numerical Analysis II"
Fall 2010, undergraduate course, ACSM40390 "Numerical Analysis"
Spring 2009, undergraduate course, Math20580 "Linear Algebra and Differential equations"
Fall 2008, undergraduate course, Math20550 "Calculus III"
Fall 2008, undergraduate course, Math10550 "Calculus I"
Spring 2008, undergraduate course, Math20550 "Calculus III"

Fall 2007, undergraduate course, Math20550 "Calculus III"
Fall 2007, undergraduate course, Math10560 "Calculus II"
Spring 2007, undergraduate course, Math 20550"Calculus III"
Spring 2007, graduate course, Math 60790 "Numerical Analysis II"
Fall 2006, graduate course, Math60690 "Numerical Analysis I"

Courses taught prior to coming to Notre Dame
Fall 2001, undergraduate instructor, "Introduction to Linear Algebra", SUNY at Stony Brook
Spring 2000, teaching assistant, undergraduate course "Finite Mathematical Structures", SUNY at Stony Brook
Fall 2000, graduate instructor, "Fundamentals of Computing", SUNY at Stony Brook
Fall 1998-Spring 2000, teaching assistant, undergraduate course "Finite Mathematical Structures", SUNY at Stony Brook

Doctoral Students Advisees

Joshua Lioi (co-advised with Mark Alber), graudated in May 2013, Teaching Postdoctoral Fellow at the University of Arizona.
Huijing Du (co-advised with Mark Alber), graudated in May 2013, Postdoc research associated at UC Irvine,
Wenzhao Sun, graudated in May 2015, empolyee of Amazon.
Wenzhao Sun: Summer Internship at Amazon. 2014 Outstanding Graduate Student Teaching Awards. Team member winning Schurz Innovation Award: Using Big Data Science to Advance Media Companies
Yihao Hu, current adviee since 01/2018
Gaofei Zhang, since 02/2019
Diana Morales, since 05/2019
Yihao Fang, since 05/2019

Master Students

Michael C. H. Wu, advise milestone project, May 2013

Undergraduate senior thesis

Maria Corsaro, Fall 2013

Postdoctoral Research Associates Advisees

(co-advised with Mark Alber): EunJung Kim, Chris Sweet, Oleg Kim, Ziheng Wu, Giordano Tierra (from Universidad d Sevilla, Now Charles University, Czech Republic), Shixin Xu and Ali Nematbakhsh.

2009 - 2010, Chris Sweet, computational and mathematical biology
2009 - 2010, EunJung Kim, computational and mathematical biology

2012 - 2013, Giordano Tierra Chica, computational and mathematical biology
2012 - 2014, Ziheng Wu, computational biology
2015 – 2017, Shixin Xu, Ali Nematbakhsh, computational biology

Undergraduate REU Students Advisees

Sean Kickham (senior thesis, graduated with Honor's Math degree in Spring 2011)
Dennis J. Goebel (undergraduate research)
Erie Ye, Summer 2014, China.

Visiting students hosted

10/2017 – 08/2018. Hao Dai (supported by China Scholarship Council), PhD, Nanjing University of Areospace and Astronautics

Service

Outside chair of Oral Candidacy Examination Committee for Volkan Kacso, Department of Physics, 06/20/2007
Outside chair of Doctoral Defense Committee for Jianli Zhao, Department of Electrical Engineering, 04/12/2007
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 04/2008
Outside chair of Doctoral Defense Committee for Yue Li, Department of Aerospace and Mechanical Engineering, 06/19/2008
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 12/2008
Oral Candidacy Examination Committee for Joshua Lioi, Department of Mathematics, 01/08/2009
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 04/2009
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 08/2009
Outside chair of Doctoral Defense for Yong Tang, Department of Electrical Engineering, 11/23/2009
Oral Candidacy Exam Committee for Huijing Du, Department of Mathematics, 01/27/2010
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 04/2010
Written Ph.D candidacy examination in Numerical Analysis, Department of Mathematics, 08/2010
Doctoral Defense Committee for Jianfeng Zhu, Department of Mathematics, 04/06/2010
Doctoral Defense Committee for Richard Gejji, Department of Mathematics, 07/06/2010
Outside chair of Ph.D Candidacy Examination by Qin Yang, Department of Aerospace and Mechanical Engineering, 08/31/2010
Oral Candidacy Examination Committee for Chunlei Li, Applied and Computational Mathematics and Statistics Department, 01/21/2011

Oral Candidacy Examination Committee for Timur Kupaev, Applied and Computational Mathematics and Statistics Department, 04/29/2011
Oral Candidacy Examination Committee for John Holmes, Department of Mathematics, 05/11/2011

Dec, 2015: NSF Review Panel

2015-2017. Director of graduate studies

Feb, 2018: NSF Review Panel
Oct, 2018: NSF Review Panel

Consultant service. Evaluating senior level mathematics courses taught by the department of mathematics and statistics, Wichita State University, 04/05/2019.

Professional Memberships

Member of Society for Industrial and Applied Mathematics
Member of American Physical Society
Member of the Institute for Liquid Atomization and Spray Systems

Other Professional Activities

Review Editor for Frontiers in Computational Physiology and Medicine
Referee for Applied Numerical Mathematics, ASME Journal of Fluids Engineering, SIAM Journals, J. Comput. Phys., Physical Review Letter, PLOS Journals, Biophysical Journal.

Recent Collaborators

Mark Alber (UC Riverside)
Dinshaw Balsara (University of Notre Dame)
Joshua Shrout (University of Notre Dame)
James Glimm (SUNY at Stony Brook)
Xiaolin Li (SUNY at Stony Brook)
C.-W. Shu (Brown University)
Guang Lin (Purdue University of Notre Dame)
Yingjie Liu (Georgia Institute of Technology)
Elliot D. Rosen (IU School of Medicine at Indianapolis)
Roman Samulyak (SUNY at Stony Brook)
Ning Zhao (Nanjing Univ. of Aeronautics and Astronautics)

Graduate and Postdoctoral Advisors

Ph.D. Advisor: Xiaolin Li, SUNY at Stony Brook
Postdoctoral Advisor: James Glimm, SUNY at Stony Brook