

# Hailong Guo

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## Employment

**Visiting Assistant Professor**, Department of Mathematics, University of California, Santa Barbara, September 2015 – present. Mentor: Prof. Xu Yang.

**Research or Teaching Assistant**, Department of Mathematics, Wayne State University, August 2010- August 2015.

## Education

**Ph.D.** in Mathematics, Wayne State University, 2015.

*Dissertation*: “Recovery Techniques For Finite Element Methods And Their Applications”.

*Advisor*: Prof. Zhimin Zhang.

**M.A.** in Mathematical Statistics, Wayne State University, 2014.

**M.S.** in Computational Mathematics, Peking University, 2010.

*Dissertation*: “Research Of Direct Algorithm For Bioluminescence Tomography”.

*Advisor*: Prof. Tie Zhou.

**B.S.** in Information And Computational Science, Hunan Normal University, 2007.

## Undergraduate Student Mentoring

April Zhou, March 2016 – March 2017 (co-mentored with Prof. Xu Yang)

## Research Interests

Finite Element Methods, Spectral Methods, Superconvergence, Post-processing Technique, Eigenvalue Problems, High Frequency Wave Propagation, Interface Problems, Inverse Problems, Computational Optics.

## Publications

1. **H. Guo**, X. Yang, and Y. Zhu, Bloch theory-based gradient recovery method for computing topological edge modes in photonic graphene, arXiv:1711.01088 [math.NA], submitted.
2. G. Dong and **H. Guo**, Parametric polynomial preserving recovery on manifolds, arXiv:1703.06509 [math.NA], under revision, SIAM J. Sci. Comput., 2017.
3. **H. Guo**, Z. Zhang, and Q. Zou, A  $C^0$  Linear Finite Element Method For Sixth Order Elliptic Equations, submitted.
4. **H. Guo**, and X. Yang, Gradient recovery for elliptic interface problem: III. Nitsche’s method, J. Comput. Phys. 356 (2018), 46–63.
5. **H. Guo**, Z. Zhang, and Q. Zou, A  $C^0$  Linear Finite Element Method For Biharmonic Problems, J. Sci. Comput. 71 (2018), no. 2, 1397–1422.

6. **H. Guo**, X. Yang, and Z. Zhang, Superconvergence analysis of partially penalized immersed finite element methods, *IMA J. Numer. Anal.* (2017), DOI:10.1093/imanum/drx053.
7. **H. Guo** and X. Yang, Gradient recovery for elliptic interface problem: I. body-fitted mesh, *Commun. Comput. Phys.* 23 (2018), no. 5, 1488–1511.
8. **H. Guo** and X. Yang, Gradient recovery for elliptic interface problem: II. immersed finite element methods, *J. Comput. Phys.* 338 (2017), 606–619.
9. H. Chen, **H. Guo**, Z. Zhang, and Q. Zou, A  $C^0$  Linear Finite Element Method For Two Fourth-Order Eigenvalue Problems, *IMA J. Numer. Anal.*, 37 (2017), 2120–2138.
10. **H. Guo** and X. Yang, Polynomial Preserving Recovery For High Frequency Wave Propagation, *J. Sci. Comput.* 71 (2017), no. 2, 594–614.
11. **H. Guo**, Z. Zhang, and R. Zhao, Hessian Recovery For Finite Element Methods, *Math. Comp.* 86 (2017), no. 306, 1671–1692.
12. **H. Guo**, Z. Zhang and R. Zhao, Superconvergent two-grid schemes for Elliptic eigenvalue problems, *J. Sci. Comput.* 70 (2017), no. 1, 125–148.
13. **H. Guo**, Z. Zhang, R. Zhao, and Q. Zou, Polynomial preserving recovery on boundary, *J. Comput. Appl. Math.* 307 (2016), 119–133.
14. **H. Guo** and Z. Zhang, Gradient recovery for the Crouzeix-Raviart element, *J. Sci. Comput.* 64 (2015), no. 2, 456–476.
15. **H. Guo**, C. Huang, and Z. Zhang, Superconvergence of conforming finite element for fourth-order singularly perturbed problems of reaction diffusion type in 1D, *Numer. Methods Partial Differential Equations* 30 (2014), no. 2, 550–566.
16. C. Huang, **H. Guo**, and Z. Zhang, A spectral collocation method for eigenvalue problems of compact integral operators, *J. Integral Equations Appl.* 25 (2013), no. 1, 79–101.

## Awards

Funding support for attending CBMS Conference on Solving Problems in Multiply Connected Domains, University of California, Irvine, 2018.

Simons Foundation Travel support for attending Tsinghua Sanya International Mathematics Forum, 2017

The Karl W. and Helen L. Folley Endowed Mathematics Scholarship, Wayne State University, 2015

The Alfred L. Nelson Award for outstanding achievement in the Ph.D. Program, Wayne State University, 2015

Graduate Student Professional Travel Award, Wayne State University, 2015

Dr. Paul A. Catlin Award for outstanding achievement in the Master's Program, Wayne State University, 2014

Maurice J. Zelonka Endowed Mathematics Scholarship, Wayne State University, 2013

South Center Conference on Advanced Numerical Methods and Applications, Financial Support, University of Arkansas at Little Rock, 2013

Second Class Academic Scholarship of Peking University, 2007- 2009

Excellent Bachelor Degree Dissertation of Hunan Normal University, 2007

Third Prize in Undergraduate Mathematical Contest of Hunan Province, 2006

Excellent College Student of Hunan Normal University, 2005

First Class Academic Scholarship and Merit Student of Hunan Normal University, 2005

Government Scholarship of Hunan Province, 2004

First Class Academic Scholarship and Merit Student of Hunan Normal University, 2003

## Academic Activities

### *Selected Talks*

- The Fifth Wuhan University International Forum for Interdisciplinary Sciences and Engineering, Wuhan, China, April 20–22, 2018.
- Mathematics Colloquium, University of Melbourne, Melbourne, Australia, February 13, 2018.
- PDE/Aplied Math Seminar, University of California, Santa Barbara, January 26, 2018.
- Eigenvalue Problems: Theory, Approximation, and Applications, Tsinghua Sanya International Mathematics Forum, Sanya, China, December 25-29, 2017.
- Southern California Applied Mathematics Symposium, University of California, Irvine, June 3 2017.
- SIAM Conference on Computational Science and Engineering, Atlanta, February 27-March 3, 2017.
- PDE/Applied Math Seminar, University of California, Riverside, February 1, 2017.
- Seminar for numerical solution of nonlocal models/PDEs, Beijing Computational Science Research Center, Beijing, July 7, 2016.
- PDE/Applied Math Seminar, University of California, Santa Barbara, November 20, 2015.
- 2015 Southern California Simulations in Science Conference, Santa Barbara, October 20, 2015.
- AMS Special Session on Recent Advances in the Analysis and Applications of Modern Splitting Methods, Joint Mathematics Meetings, San Antonio, Texas, January 10-13, 2015.
- Finite Element Circus, Wayne State University, Detroit, March 28–29, 2014.
- South Center Conference on Advanced Numerical Methods and Applications, University of Arkansas at Little Rock, April 6, 2013.
- Applied Mathematics Seminar, Wayne State University, September 19, 2012.

### *Conferences and Workshops Attended*

- CBMS Conference on Solving Problems in Multiply Connected Domains, University of California, Irvine, June 18–22, 2018.
- Southern California Applied Mathematics Symposium, University of California, Santa Barbara, April 28, 2018
- Mean-field modeling and multiscale methods for complex physical and biological systems, Santa Barbara, Oct. 31 - Nov. 3, 2016.
- International Conference on Boundary And Interior Layers (BAIL) 2016, Beijing, Aug. 15 - 19, 2016.
- Summer School on Quantum and Kinetic Theory for Complex Systems, Santa Barbara, Jun 13 - 17, 2016.
- Workshop on Computational Methods for Eigenvalue Problems, Chinese Academy of Sciences, Beijing, July 15-16, 2014.
- Finite Element Circus, University of Delaware, Newark, October 18-19, 2013.
- 2013 SIAM Conference Great Lakes Section, Computational Mathematics: Modeling, Algorithms and Applications, Central Michigan University, Mount Pleasant, April 20, 2013.
- 2012 SIAM Conference Great Lakes Section, Numerical Solution of Partial Differential Equations, Wayne State University, Detroit, April 21, 2012.
- 2011 Sun Yat-sen University International Conference on Frontiers of Numerical PDEs, Sun Yat-sen University, Guangzhou, August 1-4, 2011.
- 2011 Sun Yat-sen University Workshop on Frontiers of Partial Differential Equations, Sun Yat-sen University, Guangzhou, June 8-9, 2011.

## Academic Visits

**Visiting Scholar**, Beijing Computational Science Research Center, Beijing, July 1 - August 31, 2016.

**Visiting Scholar**, Beijing Computational Science Research Center, Beijing, May 12 - August 25, 2014.

**Visiting Scholar**, Beijing Computational Science Research Center, Beijing, August 11-18, 2013.

**Visiting Scholar**, School of Mathematics and Computational Science, Sun Yat-Sen University, Guangzhou, June 10 - August 12, 2011.

## Professional Service

*Reviewer of Mathematical Reviews*

*Referee Service*

Applied Numerical Mathematics

Computers & Mathematics with applications

Discrete and Continuous Dynamical System - Series B

International Journal of Mechanics and Materials in Design

International Journal of Numerical Analysis and Modeling

Journal of Computational and Applied Mathematics

Journal of Computational Mathematics

Journal of Computational Physics

Journal of Scientific Computing

Numerical Methods for Partial Differential Equations

## Teaching Experience

*University of California, Santa Barbara*

MATH 104C: Advanced topics in numerical analysis (Two sections), Spring 2018

MATH 104B: Numerical Analysis, Winter 2018

MATH 104A: Introduction into numerical analysis, Fall 2017

MATH 104C: Advanced topics in numerical analysis, Spring 2017

MATH 8: Transition to higher mathematics, Winter 2017

MATH 6A: Vector Calculus I, Winter 2017

MATH 8: Transition to higher mathematics, Fall 2016

MATH 4B: Differential Equations, Fall 2016

MATH 6B: Vector Calculus II, Spring 2016

MATH 4A: Linear Algebra with Applications, Spring 2016

MATH 6A: Vector Calculus I, Winter 2016

MATH 4A: Linear Algebra with Applications, Fall 2015

*Wayne State University*

MAT 1050: Algebra with Trigonometry, Spring/Summer 2015

SAT 1020: Elementary Statistics, Winter 2015  
MAT 1000: Math in Today's World, Fall 2014  
SAT 1020: Elementary Statistics, Winter 2014  
MAT1050: Algebra with Trigonometry, Fall 2013  
MAT 2030: Calculus III, Spring/Summer 2013  
MAT 1050: Algebra with Trigonometry, Winter 2013  
MAT 1800: Precalculus, Fall 2012  
MAT 2010: Calculus I, Spring/Summer 2012  
MAT 1800: Precalculus, Winter 2012

## Computer Skills

### *Operator System*

Linux, macOS.

### *Programming Language*

C/C++, Fortran, MPI, Python, Bash.

### *Finite Element Package*

AFEPack, deal.ii, FreeFem++, FEniCS, iFEM, IFISS.

### *Numerical Software*

Matlab, Mathematica, Maple.