

# Limin Ma

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## PARTICULARS

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### EDUCATION

**Pennsylvania State University**  
Postdoc in Department of Mathematics  
Supervisor: Prof. Jinchao Xu

State College, USA  
*Aug.2018 - present*

**Peking University**  
Ph.D. in Department of Scientific and Engineering Computing  
Supervisor: Prof. Jun Hu

Beijing, China  
*Sep.2013 - Jul.2018*

**Wuhan University**  
B.S. in Department of Computational Mathematics

Hubei, China  
*Sep.2009 - Jul.2013*

### RESEARCH INTERESTS

My research interest regards the approximation by finite elements of partial differential equations. In particular, I worked on the following areas:

- Nonconforming finite element methods for eigenvalue problems
- Superconvergence of nonconforming elements and mixed elements
- Finite element methods for linear elasticity problems

### DISSERTATION

Title: "High accuracy methods for eigenvalue problems by nonconforming elements"  
Advisor: Prof. Jun Hu

My thesis concentrates on the analysis of high accuracy methods and proposes some algorithms to improve the accuracy of eigenvalues by finite element methods. It includes:

- The first asymptotic expansions of eigenvalues by the nonconforming Crouzeix-Raviart element and the enriched Crouzeix-Raviart element
- Design two types of asymptotically exact a posteriori error estimators
- Propose the penalized Crouzeix-Raviart element which aims to improve the accuracy of large amounts of eigenvalues
- Prove an optimal superconvergence result for two nonconforming elements

### PUBLICATIONS

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1. J. Hu and **L. Ma\***, "A Penalized Crouzeix–Raviart Element Method for Second Order Elliptic Eigenvalue Problems", *Journal of Scientific Computing*, 74(3):1457-1479, 2018.
2. J. Hu and **L. Ma\***, "Asymptotically Exact A Posteriori Error Estimates of Eigenvalues by the Crouzeix–Raviart Element and Enriched Crouzeix–Raviart Element", *SIAM Journal on Scientific Computing*, 42(2): A797–A821, 2020.
3. J. Hu and **L. Ma\***, "Asymptotic Expansions of Eigenvalues by both the Crouzeix-Raviart and Enriched Crouzeix-Raviart elements", *Mathematics of Computation*, accepted, 2021.
4. J. Hu, **L. Ma\*** and R. Ma, "Optimal Superconvergence Analysis for the Crouzeix-Raviart and the Morley elements", *arXiv:1808.09810v2*, submitted to *Advances in Computational Mathematics*, accepted, 2021.

5. **L. Ma\***. “Superconvergence of Discontinuous Galerkin Methods for the Scaler Elliptic Problems and Linear Elasticity Problems”, *arXiv:2010.10507, Journal of Scientific Computing*, accepted, 2021
6. Q. Hong, J. Hu, **L. Ma\*** and J. Xu. “Extended Galerkin Method for Linear Elasticity with Strongly Symmetric Stress Tensor”, *arXiv:2002.11664*, submitted to *Numerische Mathematik*, 2020
7. Q. Hong, J. Hu, **L. Ma** and J. Xu. “Extended Galerkin Method for Stokes Problems”, in preparation
8. **L. Ma\***. “Asymptotic Expansions of Eigenvalues by the Morley Element for the Fourth Order Elliptic Problems”, in preparation.

## TEACHING EXPERIENCE

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- **Instructor.** MATH 230: Calculus and Vector Analysis, Spring 2020, Pennsylvania State University.
- **Instructor.** MATH 251: Ordinary and Partial Differential Equations , Spring 2019, Pennsylvania State University.
- **Teaching Assistant.** MATH 555: Numerical Optimization, Prof. Jinchao Xu, Spring 2021, Pennsylvania State University.
- **Teaching Assistant.** MATH 597(section 003): Special Topics, Prof. Jinchao Xu, Spring 2019, Pennsylvania State University.
- **Teaching Assistant.** MATH 556: Finite Element Methods , Prof. Jinchao Xu, Fall 2018, Pennsylvania State University.

## ACADEMIC ACTIVITIES

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- Attend the 2019 AMS-JMM at Baltimore, January 16-19, 2019.
- Attend the fall 2018 FE Circus at Delaware, November 9-10, 2018.
- Co-organizer of 4th Graduate Forum on Numerical Methods for Partial Differential Equations, Peking University, China, July 2016.
- Co-organizer of 2nd Beijing Graduate Forum on Computational Mathematics, Peking University, China, August 2015

## ACADEMIC HONORS

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- Award for Scientific Research, Peking University, 2017.
- Special Scholarship for Scientific Research , Peking University, 2017.

## PRESENTATIONS

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1. *15th Annual Meeting of China Society for Industrial and Applied Mathematics*, Qingdao, China, October 2017.
2. *11th National Conference on Computational Mathematics*, Xi'an, China, July 2017.
3. *9th National Conference on Finite Elements*, E'mei, China, August 2016.
4. *4th Graduate Forum on Numerical Methods for Partial Differential Equations*, Peking University, China, July 2016.

## REFERENCES

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Prof. **Jinchao Xu** (Postdoc Advisor)  
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 www.math.psu.edu/xu

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 School of Mathematical Sciences & Peking University  
 Beijing, 100871, China  
 hujun@math.psu.edu.cn