Limin Ma

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PARTICULARS

EDUCATION

Pennsylvania State University — State College, USA
Postdoc in Department of Mathematics — *Aug.2018 - present*
Supervisor: Prof. Jinchao Xu

Peking University — Beijing, China
Ph.D. in Department of Scientific and Engineering Computing — *Sep.2013 - Jul.2018*
Supervisor: Prof. Jun Hu

Wuhan University — Hubei, China
B.S. in Department of Computational Mathematics — *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

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", *Advances in Computational Mathematics 47(4): 1-25*, 2021.

5. **L. Ma***. "Superconvergence of Discontinuous Galerkin Methods for the Scaler Elliptic Problems and Linear Elasticity Problems", *Journal of Scientific Computing, 88(3):1-20*, 2021
6. Q. Hong, J. Hu, **L. Ma*** and J. Xu. "Extended Galerkin Method for Linear Elasticity with Strongly Symmetric Stress Tensor", *Numerische Mathematik*, accepted, 2021
7. Jonathan Seigel, **L. Ma** and J. Xu. "Uniform Approximation Rates and Metric Entropy of Barron Spaces", submitted, 2021
8. **L. Ma*** and Shudan Tian. "New Fourth Order Postprocessing Techniques for Plate Buckling Eigenvalues by Morley Element", submitted, 2021
9. Q. Hong, J. Hu, **L. Ma** and J. Xu. "A new approach and efficient preconditioner for time dependent Ginzburg-Landau problems", in preparation
10. Q. Hong, **L. Ma** and J. Xu. "Extended Galerkin Method for Stokes Problems", in preparation

TEACHING EXPERIENCE

- **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

- 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

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

PRESENTATIONS

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

Prof. **Jinchao Xu** (Postdoc Advisor)
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Prof. **Jun Hu** (Ph.D. Thesis Advisor)
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