

# Xingjie Li

---

## CONTACT INFORMATION

127 Vincent Hall, 206 Church St SE  
Minneapolis, MN, 55455, USA  
www.math.umn.edu/~lixxx835

Tel: (612) 702-5560

E-mail: lixxx835@umn.edu

## EDUCATION

### University of Minnesota, Twin Cities

PhD candidate in Mathematics

May 2012 (expected)

Adviser: Prof. Mitchell Luskin

GPA: 3.984/4.0

Thesis: *The Development and Analysis of Atomistic-to-Continuum Coupling Methods*

### Fudan University, Shanghai, China

B.S. in Mathematics,

Jul 2007

Adviser: Prof. Wenbin Chen

GPA: 3.6/4.0 (top 5%)

Thesis: *Energy-Conserved Splitting FDTD Methods for Maxwell Equations*

## RESEARCH EXPERIENCE

### University of Minnesota

Research Assistant under the guidance of Prof. Mitchell Luskin.

**Research Interests** include numerical analysis, multiscale methods in material science and PDE modeling.

- 2011-present: *Positive-Definiteness of the Blended Force-Based approximation model*
  - Studied the stability of the blended force-based approximation model for crystalline materials in one and two dimensional spaces.
  - Identified and proved the optimal conditions for a stable simulation model.
- 2010-2011: *Quasi-Nonlocal Approximation of the Embedded Atom Model*
  - Developed a consistent atomistic-to-continuum coupling method for the embedded atom model with next-nearest neighbor interactions.
  - Studied the sharp stability and error analysis for atomistic chains .
- 2010-2011: *Lattice Stability of the Embedded Atom Model and its Local Approximations*
  - Studied the lattice stability for atomistic chains modeled by the embedded atom method (EAM) with their approximation by local Cauchy-Born models.
  - Identified the critical assumptions for the EAM energy functions for the lattice stability of the atomistic and different local models.
- 2010-2011: *Computational and Theoretical Investigations of the Accuracy of Quasi-continuum Methods*
  - Designed two benchmark problems to compare the accuracy and stability of several atomistic-to-continuum approximation models.
- 2009-2010: *Generalized Quasi-Nonlocal Coupling Models with Finite-Range Interactions*
  - Generalized the consistent atomistic-to-continuum model to arbitrary finite-range interactions for atomistic chains.
  - Studied the sharp stability and error analysis for atomistic chains .

## Fudan University

Research Assistant under the guidance of Prof. Wenbin Chen.

**Research Interests** include numerical analysis, computational electromagnetics and math modeling.

- 2006-2007: *Energy-Conserved Splitting Finite-Difference Time-Domain Methods for Maxwell's Equations*
  - Proposed two new efficient algorithms for electrical simulation in two and three dimensional spaces. Studied the stability and convergence rate of the new algorithms.
- 2006-2007:
  - Developed a math model for evaluating the effectiveness of lung cancer treatment.
  - Conducted research work in the project 'Optical Fiber Sound Sensor'.

## TEACHING EXPERIENCE

Spring 2011: Math 1155 Intensive Precalculus Instructor for the Discussion Class.

Fall 2008: Math 1271 Calculus I Instructor for the Discussion Class.

Spring 2008: Math 1372 IT Calculus II Instructor for the Discussion Class.

Fall 2007: Math 1031 College Algebra and Probability Instructor for the Discussion Class.

## ACADEMIC COMMUNICATIONS

- Invited talk: The 11th US National Congress on Computational Mechanics the 2011 minisymposium.  
*An Analysis of The Quasi-Nonlocal Quasi-continuum Approximation Of The Embedded Atom Model.* July 25 - July 29, 2011, Minneapolis, MN, USA.
- Invited talk: Nonlinear PDE colloquium at Oxford University, UK.  
*Stability Analysis of The Atomistic and QC Approximations for The EAM Model,* Oxford University, Oct 25, 2011.
- Conference: The 2011 von Neumann Symposium on Multimodel and Multialgorithm Coupling for Multiscale Problems from July 04, 2011 to July 07, 2011, Snowbird Resort, Snowbird, UT.
- Visiting scholar: University of Warwick, UK. Oct 15, 2011 - Nov 5, 2011.

## PUBLICATIONS

### Journal Papers

1. Brian Van Koten, Xingjie Li, Mitchell Luskin, and Christoph Ortner. A Computational and Theoretical Investigation of the Accuracy of Quasi-continuum Methods. *In Ivan Graham, Tom Hou, Omar Lakkis, and Rob Scheichl, editors, Numerical Analysis of Multiscale Problems. Springer, to appear. arXiv:1012.6031.*
2. Xingjie Li and Mitchell Luskin. A Generalized Quasi-Nonlocal Atomistic-to-Continuum Coupling Method with Finite Range Interaction. *IMA Journal of Numerical Analysis, 2011, 10.1093/imanum/drq049.*
3. Xingjie Li and Mitchell Luskin. An Analysis of the Quasi-Nonlocal Quasicontinuum Approximation of the Embedded Atom Model. *International Journal for Multiscale Computational Engineering, 2010, accepted.*
4. Wenbin Chen, Xingjie Li and Dong Liang. Energy-Conserved Splitting Finite-Difference Time-Domain Methods for Maxwell's Equations in Three Dimensions. *SIAM Journal on Numerical Analysis, 2010, Vol.48, No.4.*

5. Wenbin Chen, Xingjie Li and Dong Liang. Energy-conserved splitting FDTD methods for Maxwell equations. *Numerische Mathematik*, 2008, Volume 108, Number 3, 445-485.
6. Wenbin Chen, Xingjie Li and Dong Liang. Symmetric Energy-Conserved Splitting FDTD Scheme for the Maxwell's Equations. *Communications in Computational Physics*, 2008, vol. 6, issue 4, pp. 804-825.

### Current Papers

1. Xingjie Li, Mitchell Luskin and Christoph Ortner. Positive-definiteness of the Blended Force-Based Quasicontinuum Method. *manuscript*.
2. Liping Gao, Xingjie Li and Wenbin Chen. New Energy identities and Super Convergence Analysis of the Energy Conserved Splitting FDTD methods for 3D Maxwell's Equations. *submitted*.
3. Xingjie Li and Mitchell Luskin. Lattice Stability for Atomistic Chains Modeled by Local Approximations of the Embedded Atom Method. *submitted*. *arXiv:1108.4473v1*.
4. Xingjie Li and Christoph Ortner. Blended Force-Based Quasicontinuum Method for General Potentials: Formulation and Consistency. *In preparation*.

### AWARDS

- University of Minnesota Graduate School Doctoral Dissertation Fellowship 2011-12
- First prize of China Undergraduate Mathematical Contest in Modeling in 2006
- First Prize of Renmin Scholarship at Fudan University of the 2003 -2004 academic year