

# Son-Young Yi

Department of Mathematical Sciences  
University of Texas at El Paso  
500 W. University Ave.  
El Paso, TX 79968-0514

Phone: (915) 747-6864  
Fax: (915) 747- 6502  
E-mail: syi@utep.edu  
URL: <http://www.math.utep.edu/faculty/yi/>

## Education

- Ph. D.** in Mathematics, Purdue University, West Lafayette, IN Aug. 2006  
Major Area: Numerical Analysis and Scientific Computing  
Advisor: Jim Douglas, Jr.  
Thesis title: Nonconforming Mixed Finite Element Methods for Linear Elasticity
- M. S.** in Mathematics, Seoul National University, Korea Feb. 1998
- B. S.** in Mathematics Education, Korea University, Korea Feb. 1996

## Employment

- Assistant Professor**, University of Texas at El Paso Sept. 2009 – present
- Research Assistant Professor**, University of Texas at El Paso July 2009 – Aug. 2009
- Postdoctoral Research Associate**, Oregon State University Sept. 2006– June 2009
- Graduate Instructor**, Purdue University 2002 – 2006
- Graduate Research Assistant**, Purdue University 2003 – 2004
- Graduate Teaching Assistant**, Purdue University 1998 – 2001
- Graduate Teaching Assistant**, Seoul National University 1997 – 1998

## Research Interests

- Numerical methods for partial differential equations
- Multiscale, multiphase flow and transport problem in porous media
- Multiscale finite element/volume methods
- Homogenization and multiscale analysis
- Elasticity, Poroelectricity

## Publications

### Peer-reviewed

- (with Jim Douglas, Jr. and Anna M. Spagnuolo) The convergence of a multidimensional, locally conservative, Eulerian-Lagrangian finite element method for a semilinear parabolic equation, *Math. Models and Methods Appl. Sci. (M3AS)*, vol. 20, no. 2, pp. 315–348, 2010.
- (with M. Peszyńska and R. E. Showalter) Numerical upscaled model of transport with non-separated scales, XVIII International Conference on Water Resources, CMWR 2010, J. Carreta (Ed), Barcelona, 2010.
- (with M. Peszyńska and R. E. Showalter) Homogenization of a pseudoparabolic system, *Applicable Analysis*, vol. 88, no. 9, pp. 1265–1282, 2009.
- (with M. Peszyńska) Numerical methods for unsaturated flow with dynamic capillary pressure in heterogeneous porous media, *Int. J. Numer. Anal. Model.* vol. 5, Supp, pp. 126-149, 2008
- A new nonconforming mixed finite element method for linear elasticity, *Math. Models Methods Appl. Sci.*, vol. 16, no. 7, pp. 979–999, 2006.
- Nonconforming mixed finite element methods for linear elasticity using rectangular elements in two and three dimensions, *Calcolo* vol. 42, no. 2, pp. 115–133, 2005.

### Under review

- A coupling of nonconforming and mixed finite element methods for Biot's consolidation model, submitted, 2011.
- (with Jim Douglas, Jr.) An Experimental Study of Several Multidimensional, Locally Conservative, Eulerian-Lagrangian Finite Element Methods for a Semilinear Parabolic Equation, submitted, 2011.

### Theses

- Nonconforming mixed finite element methods for linear elasticity, Ph.D. Thesis, Purdue University, 2006.
- Crystal graphs for  $U_q(sl(2, 1))$ , M.S. Thesis, Seoul National University, 1998.

## Grant Support

- PI  
The University Research Institute(URI) grant, “Development, analysis and implementation of numerical methods for flow in deformable porous media ”, 01/01/11 –12/31/11.
- Co-PI (PI: Małgorzata Peszyńska)  
National Science Foundation, DMS, NSF 0707562, “Modeling, Analysis and Simulation of Multiscale Nonlinear Systems: Workshop at Oregon State University”, 05/01/07 – 04/30/08.
- Senior Personnel and Participant (PI: Ralph Showalter )  
Department of Energy, Office of Science, Multiscale Mathematics Initiative Project 98089, “Modeling, Analysis, and Simulation of Multiscale Preferential Flow”, 08/15/05 – 08/14/08.

## Teaching Experience

### Courses taught at University of Texas at El Paso

- Computational Methods of Linear Algebra (MATH 5330), Spring 2012
- Numerical Analysis (MATH 4329), Fall 2011, Spring 2012
- Dissertation Seminar (CPS 6195), Spring 2012
- Numerical Solutions for Partial Differential Equations (MATH 5343), Spring 2010, Spring 2011
- Numerical Analysis (MATH 5329), Fall 2009, Fall 2010
- Interdisciplinary Graduate Seminar (CPS 5195), 2009, 2010, 2011

### Courses taught at Oregon State University

- Matrix & Power Series Methods (MTH 306), Winter, Spring 2007, Winter 2008, Spring 2009
- Integral Calculus (MTH 252), Spring 2008, Winter 2009
- Introduction to Numerical Analysis (MTH 351), Fall 2008
- Differential Calculus (MTH 251), Fall 2007

### Courses taught at Purdue University

- Introductory Analysis I & II (MA 223, 224), Spring 2003, Fall 2005, Spring 2006
- Linear Algebra (MA 265), Summer 2005
- Algebra & Trigonometry (MA 154), Spring 2002
- Calculus, Advanced Calculus (Recitation), 1998–2001

## Service

### Departmental service

- Member, Students Competitions Committee, Spring 2011, Spring 2012
- Co-Advisor, Club Zero (UTEP's student math club), Fall 2009 – Spring 2010.

### College service

- Member, Graduate Curriculum Committee, Fall 2011 – present.
- Attendee, Meeting for developing the Strategic Plan for the College of Science, Fall 2010.

### Professional service

- Mini-symposium organizer, 2012 SIAM Annual Conference, 2012
- Journal reviewer, Journal of Mathematical Modelling and Algorithms, Journal of Applied Mathematics
- Session chair, SIAM Geoscience conference, Long beach, March 2011.
- Member, Organizing committee of the workshop on “Modeling, Analysis, and Simulation of Multiscale Nonlinear Systems” in cooperation with the Society for Industrial and Applied Mathematics (SIAM) Activity Group on Geosciences, Oregon State University, June 25–29, 2007.

## Fellowships, Awards and Honors

- The Association for Women in Mathematics (AWM) Travel Grant, 2010
- Society for Industrial and Applied Mathematics(SIAM) Early Career Travel Award, 2007
- Outstanding Graduate Instructor, Department of Mathematics, Purdue University, 2005
- Research Fellowship, Purdue Research Foundation, 2003–2004
- Summer Research Fellowship, Purdue Research Foundation, 2001, 2002
- First Class Honors, Korea University, 1993–1995
- Honors Scholarship, Korea University, 1992–1995

## Presentations

- “Numerical Upscaled Model of Flow and Transport with Non-Separated Scale”, the 10th Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, UTEP, El Paso, TX, November 5, 2011.

- "Numerical modeling and methods for some applications in porous media", CPS Graduate Seminar, UTEP, El Paso, TX, September 28, 2011.
- "A Nonconforming Mixed Finite Element Method for Poroelasticity", the 7th International Congress on Industrial and Applied Mathematics - ICIAM 2011, Vancouver, BC, Canada, July 22, 2011.
- "Numerical Method for Poroelasticity Based on a Coupling of Nonconforming and Mixed Finite Element Methods", SIAM Conference on Mathematical & Computational Issues in the Geosciences, Long Beach, CA, March 22, 2011.
- "Numerical upscaled model of transport with non-separated scales", XVIII International Conference on Computational Methods in Water Resources, Barcelona, Spain, June 24, 2010.
- "Non-uniform Particle Size Explains Reduction in Filtration Rates with Transport Distance in Porous Media", Applied Mathematics and Computational Seminar, Oregon State University, Nov. 6, 2009.
- "Flow with dynamic capillary pressure over multiple scales", Applied Mathematics Seminar, New Jersey Institute of Technology, April 9, 2009.
- "Flow with dynamic capillary pressure over multiple scales", CPS Colloquium, University of Texas at El Paso, March 12, 2009.
- "Numerical methods for unsaturated flow with dynamic capillary pressure in heterogeneous porous media", XVII International Conference on Computational Methods in Water Resources, San Francisco, July 7, 2008.
- "Numerical methods for saddle point problems", Applied Mathematics and Computation Seminar, Oregon State University, May 25, 2008.
- "Comparison of numerical methods for unsaturated flow with dynamic capillary pressure", Applied Mathematics and Computation Seminar, Oregon State University, Oct. 19, 2007.
- "Modeling preferential flow in subsurface", US Congress on Computational Mechanics, San Francisco, July 23–26, 2007 (joint with M. Pezzyńska and R. E. Showalter).
- "Numerical modeling of unsaturated flow with dynamic capillary pressure", Multiscale Workshop at Oregon State University, June 26, 2007.
- "Multidimensional, Locally Conservative, Eulerian-Lagrangian Finite Element Methods for a Semilinear Parabolic Equation", SIAM Conference on Mathematical and Computational Issues in the Geosciences", Santa Fe, Mar. 21, 2007.
- "Nonconforming Mixed Finite Element Methods for Linear Elasticity", Applied Mathematics and Computation Seminar, Oregon State University, Feb. 2, 2007.

- “Multidimensional, Locally Conservative Eulerian-Lagrangian Finite Element Methods for a Semilinear parabolic equation”, Applied Mathematics and Computation Seminar, Oregon State University, Feb. 24, 2006.
- “Nonconforming Mixed Finite Element Method for Linear Elasticity”, Computational Applied Mathematics Seminar, Purdue University, Nov. 19, 2004.
- “Nonconforming Mixed Finite Element Method for Linear Elasticity Using Rectangular Elements”, Finite Element Circus, University of Pittsburgh, Apr. 16, 2004.

### **Conference, Workshop, Summer School Participation**

- DOE Summer School in Multiscale Mathematics and High Performance Computing, Oregon State University, June 29–July 3, 2007.
- Workshop on Modeling, Analysis, and Simulation of Multiscale Nonlinear Systems, in cooperation with the Society for Industrial and Applied Mathematics (SIAM) Activity Group on Geosciences, Oregon State University, June 25–29, 2007.
- STOMP (Subsurface Transport over Multiple Phases, software developed at Pacific Northwest National Laboratory) Short Course, Oregon State University, May 24–25, 2007.
- Pacific Northwest Numerical Analysis Seminar, Simon Fraser University, Canada, Sept. 30, 2006
- Summer School in Geophysical Porous Media: Multidisciplinary Science from Nano to Global Scale, Purdue University, July 17–28, 2006.
- Conference on 50 Years of Alternating Direction Methods: Celebrating the Contributions of Jim Douglas, Don Peaceman, and Henry Rachford, Rice University, Nov. 4–5, 2005.
- Finite Element Circus, Wayne State University, Mar. 28–29, 2003.

### **Computer Expertise**

- OS: Unix, Linux, Windows
- Languages: Fortran 90, C, Basic
- Tools: Matlab, Mathematica, Excel

### **Professional Memberships**

- Society for Industrial and Applied Mathematics
- American Mathematical Society
- The Association for Women in Mathematics