

Contact Information

544 Wachman Hall
1805 North Broad Street
Department of Mathematics
Temple University
Philadelphia, PA 19122, USA

Phone: +1-(215)-204-7588
Fax: +1-(215)-204-6433
Email: fxue@temple.edu
URL: <http://www.math.temple.edu/~fxue/>

Education

- Ph.D. Applied Mathematics and Scientific Computation, University of Maryland (August 2009)
Dissertation Topic : *Numerical Solution of Eigenvalue Problems with Spectral Transformations*
Dissertation Advisor: Howard C. Elman
- M.E. Computer Engineering, Southeast University, China (June 2004)
- B.E. Computer Engineering, Southeast University, China (May 2001)

Research Interests

Numerical analysis, scientific computation, numerical linear algebra

My major research interests concern development and analysis of state-of-the-art numerical methods related to iterative solution of linear system of equations, linear and nonlinear eigenvalue problems and matrix equations arising from a variety of applications, such as discretized PDEs, control, and numerical optimization.

Employment

Temple University (current position)

Research Assistant Professor, August 2009 – present

- Research on iterative solution of large sparse eigenvalue problems and linear systems
- Teaching undergraduate mathematics courses, including Calculus, Linear Algebra and Numerical Analysis

The Mathworks Inc., Natick Massachusetts

MATLAB Math Group Intern, May – August 2008

- Functionality extension of `eigs` for generalized eigenvalue problems (GEVPs);
- Refinement of existing Krylov subspace linear solvers, and `gmres` in particular;
- Development of `tfqmr` and `bicgstab(e11)` (efficient Krylov subspace methods for non-Hermitian systems)

The above three pieces of work have been incorporated in MATLAB R2009a and later versions.

University of Maryland, College Park, Maryland

Graduate Research Assistant, January 2007 – August 2009

- Development and analysis of new inexact eigenvalue algorithms.

Graduate Teaching Assistant, September 2004 – December 2006

- Sole classroom contact sessions for undergraduate mathematics courses. Homework and tests grading.

Research Grants and Contracts

- National Science Foundation (NSF) Research Grant DMS-1115520, Co-P.I. (P.I.: Daniel B. Szyld)
Eigenvalues problems, Krylov subspace methods, and subspace recycling, Division of Mathematical Sciences, Program in Computational Mathematics, August 2011 – July 2014, \$280,000.

Publications

Journal publications (published and submitted)

1. Mark Embree, Josef A. Sifuentes, Kirk M. Soodhalter, Daniel B. Szyld, and Fei Xue, *On short-term recurrence Krylov subspace methods for nearly-Hermitian matrices*, Research Report 11-10-10, Department of Mathematics, submitted.
2. Daniel B. Szyld and Fei Xue, *Local convergence analysis of several inexact Newton-type algorithms for general nonlinear eigenvalue problems*, Research Report 11-08-09, Department of Mathematics, Temple University, August 2011, submitted.
3. Fei Xue and Howard C. Elman, *Fast inexact implicitly restarted Arnoldi method for generalized eigenvalue problems with spectral transformation*, Technical Report, Department of Computer Science, University of Maryland, February 2010, submitted in revised form to SIAM Journal on Matrix Analysis and Applications.
4. Daniel B. Szyld and Fei Xue, *Efficient preconditioned inner solves for inexact Rayleigh quotient iteration and their connections to the single-vector Jacobi-Davidson method*, SIAM Journal on Matrix Analysis and Applications, Vol. 32 (2011), pp. 993–1018.
5. Fei Xue and Howard C. Elman, *Fast inexact subspace iteration for generalized eigenvalue problems with spectral transformation*, Linear Algebra and Its Applications, Vol. 435 (2011), pp 601–622.
6. Fei Xue and Howard C. Elman, *Convergence analysis of iterative solvers in inexact Rayleigh Quotient Iteration*, SIAM Journal on Matrix Analysis and Applications, Vol. 31 (2009), pp 877–899.

In preparation

- *Error bounds, perturbation analysis and subspace projections for invariant pairs of general nonlinear eigenvalue problems*, with Daniel B. Szyld.
- *Inexact augmented Krylov subspace methods for sequences of linear systems*, with Daniel B. Szyld.

Conference proceedings

1. Fei Xue and Howard C. Elman, *Convergence analysis of iterative solvers in inexact Rayleigh Quotient Iteration*, Proceedings of 10th Copper Mountain Conference on Iterative Methods, 2008.

Technical report

1. Fei Xue, *MPI-based simulation of the dynamics of large multi-particle systems using fast multipole method (FMM) with multi-scale time stepping*, AMSC 663–664 course final report, University of Maryland, 2005

Early peer-refereed papers in Chinese

1. Ding Yong, Xue Fei and Zhang Zhen. *The Order and Transportation of Pipelines*, Mathematics in practice and theory, Vol. 31, 2001.
2. Xue Fei and Du Qing-wei, *GIOP CDR characteristics research and its application*, Computer Applications, Vol. 23, 2003.
3. Xue Fei, *An Interceptor-based Fault-Tolerant ORB prototype system*, Computer Engineering, Vol. 1, 2004.

Selected Presentations and Posters

1. *Analytical and experimental results for inexact methods for linear and nonlinear eigenvalue problems*, with Daniel B. Szyld, poster presented at the 2011 DOE Applied Mathematics Program Meeting, Washington, DC, October 2011.
2. *Efficient inner solves for inexact Rayleigh Quotient Iteration and their connections to the single-vector Jacobi-Davidson method*, Householder Symposium XVIII, Tahoe City, California, June 2011.

3. *Efficient inexact Rayleigh Quotient Iteration and its connections to the Jacobi-Davidson method*, Numerical Analysis and Scientific Computing Seminar, Courant Institute of Mathematical Sciences, New York University, March 2011.
4. *Fast inexact implicitly restarted Arnoldi method for generalized eigenvalue problems with spectral transformation*, SIAM Annual Meeting 2010, Pittsburg, Pennsylvania, July 2010.
5. *Introduction to the Jacobi-Davidson method for eigenvalue problems*, Applied Mathematics and Scientific Computation seminars, Temple University, February 2010.
6. *Numerical solution of eigenvalue problems with spectral transformation*, Applied Mathematics and Scientific Computation seminars, Temple University, September 2009.
7. *Numerical solution of eigenvalue problems with spectral transformation*, Workshop on “Advances and Perspectives on Numerical Methods for Saddle Point Problems”, Banff, Alberta, Canada, April 2009
8. *Numerical solution of eigenvalue problems with spectral transformation*, Lawrence Berkeley National Laboratory, Berkeley, California, April 2009
9. *Convergence analysis of iterative solvers in inexact Rayleigh Quotient Iteration*, invited talk in student paper winner session, 10th Copper Mountain Conference on Iterative Methods, Colorado, April 2008.
10. *Tuning of preconditioners for inner iterations in inexact Rayleigh Quotient Iteration*, presentation on Spotlight on Graduate Research Competition, University of Maryland, November 2007.
11. *Introduction to preconditioned iterative solvers in eigenvalue computation*, AMSC student seminar, University of Maryland, October 2007.
12. *MPI-based simulation of the dynamics of large multi-particle systems using fast multipole method (FMM) with multi-scale time stepping*, AMSC 663-664 course final report, University of Maryland, May 2006.

Editorial work

- Refereed papers for the following journals
 - *Journal of Computational Physics*
 - *Linear Algebra and Its Applications*
 - *Mathematics of Computation*
 - *SIAM Journal on Numerical Analysis*.

Other Professional Activities

- Committee member, Doctoral thesis defense for Kirk M. Soodhalter, expected May 2012.

Teaching

- Introduction to Numerical Analysis (graduate), Spring 2012, scheduled.
- Calculus I (undergraduate), Fall 2011.
- Linear Algebra (undergraduate), Fall 2010.
- Calculus III (undergraduate), Fall 2009, Spring 2011.

Student Honors and Awards

1. *Seymour Goldberg Award* (Winner of Spotlight on Graduate Research Written Competition), Department of Mathematics, University of Maryland, 2009.
2. *Student Paper Winner*, 10th Copper Mountain Conference on Iterative Methods, Colorado, 2008.
3. *Monroe Martin Award* (Winner of Spotlight on Graduate Research Speaking Competition), Department of Mathematics, University of Maryland, 2007.
4. *Nomination of Best Teaching Assistant*, Department of Mathematics, University of Maryland, 2005.

5. *Graduate Dean's Fellowship*, University of Maryland, 2004.
6. *Meritorious in Mathematical Contest in Modeling* (MCM) awarded by Consortium for Mathematics and Its Applications (COMAP), 2000.
7. *First Prize in China Undergraduate Mathematical Contest in Modeling* (CUMCM), 2000.
8. *IBM China Outstanding Undergraduate Scholarship*, 2000

Skills

- Languages: Fluent MATLAB, C and Java programming; experience with Mathematica, FORTRAN 90/95, C++ and MPI.
- Systems: Windows, Macintosh, Fedora Linux, Vnode cluster.

Professional Memberships

- SIAM.