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Department of Computer Science

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RESEARCH INTERESTS

Graph algorithms, parallel algorithms, Laplacian spectra, scientific computing, linear algebra, linear systems, combinatorial optimization, graph theory, complexity.

EDUCATION

Carnegie Mellon University. Ph.D., Computer Science, September 1995.

Thesis: *Applications of Graph-Theoretical Properties in Algorithms.*

Advisor: Gary Miller

University of Michigan. MSE, Computer, Information, and Control Engineering, August 1980.

Massachusetts Institute of Technology. BS, Electrical Engineering, June 1979.

Swarthmore College. BA with Honors, English Lit., Music minor, June 1976.

TEACHING EXPERIENCE

Bucknell University. Assistant Professor, starting Fall 1998.

Responsible for teaching two courses and two lab sections per semester.

Carnegie Mellon University. Teaching Assistant.

CITIZENSHIP

US citizen.

WORK EXPERIENCE

Department of Computer Science. Bucknell University,
Lewisburg, PA August 1998 – present.

Visiting Assistant Professor 1998 – 1999. Assistant Professor 1999 – present. Responsible for teaching undergraduate courses and lab sessions in Computer Science. Courses taught include Introduction to Computer Science I and II, Machine Organization and Programming, Data Structures, Analysis of Algorithms, Operating Systems, and Senior Design Project.

ICASE. NASA Langley Research Center, Hampton, VA.
September 1995 – August 1998.

Staff Scientist. Responsible for research in parallel algorithms and related topics as they apply to numerical methods. Specific interests include graph partitioning and the application of graph-theoretical properties to sparse symmetric matrix problems.

Editor of the *ICASE Research Quarterly*, May 1997 – August 1998.

AT&T BELL LABORATORIES. Holmdel, NJ. June 1979 – August 1988.

6/79 – 12/85: Member of Technical Staff, Network Management Department. Systems engineer for minicomputer systems used in network management operations (In AT&T parlance, “network management” referred to maximizing the number of calls completed through the toll telephone network when it is under stress as a result of unusual traffic loads or equipment failure). Responsible for doing studies to support planning (e.g., estimating data volumes, cost/benefits studies, capacity studies) and for preparing specifications for new system capabilities and for user interfaces. Earned master’s degree at the University of Michigan under the One Year On Campus (OYOC) program (6/79 – 7/80).

1/86 – 8/88: MTS-Supervisor, Switching Systems Operations Systems Department. Responsible for managing a group of systems engineers working on computerized support of switching system maintenance. This included technical management of projects and administrative tasks such as budget preparation, recruiting, and performance appraisal.

**JOURNAL
PAPERS**

Graph Embeddings and Laplacian Eigenvalues, with Gary Miller. SIAM Journal on Matrix Analysis and Applications v.21(3), pp. 703–723, 2000.

The Path Resistance Method for Bounding the Smallest Nontrivial Eigenvalue of a Laplacian, with Tom Leighton and Gary Miller. Combinatorics, Probability, and Computing v.8(5), pp. 441–460, September 1999.

On the Quality of Spectral Separators, with Gary Miller. SIAM Journal on Matrix Analysis and Applications v.19(3), pp. 701–719, July 1998.

Chromatic Equivalence of Generalized Ladder Graphs, with Gary Haggard and Ronald C. Read. To appear in *Ars Combinatoria*.

**PAPERS TO BE
REVISED AND
RESUBMITTED**

An Eigenvalue Relation with Applications to Support Theory and Preconditioning, with Erik Boman and Bruce Hendrickson. Submitted to *Linear Algebra and its Applications*.

**CONFERENCE
PAPERS**

Estimating Interpolation Error: A Combinatorial Approach, with Gary Miller and Noel Walkington. Appeared in *SODA '99: Proceedings of the 10th ACM-SIAM Symposium on Discrete Algorithms*.

The Path Resistance Method for Bounding λ_2 of a Laplacian, with Tom Leighton and Gary Miller. Appeared in *SODA '97: Proceedings of the 8th ACM-SIAM Symposium on Discrete Algorithms*, pp. 201 – 210.

On the Performance of Spectral Graph Partitioning Methods, with Gary Miller. Appeared in *SODA '95: Proceedings of the 6th ACM-SIAM Symposium on Discrete Algorithms*, pp. 233 – 242.

A Contraction Procedure for Planar Directed Graphs, with Gary Miller. Appeared in *SPAA '92: Proceedings of the Fourth Annual ACM Symposium on Parallel Algorithms and Architectures*. ACM Press 1992, pp. 431 – 441.

TECH REPORTS

Graph Embeddings, Symmetric Real Matrices, and Generalized Inverses. ICASE Report 98-34, August 1998.

Graph Embeddings and Laplacian Eigenvalues, with Gary Miller. ICASE Report 98-23, June 1998.

The Path Resistance Method for Bounding the Smallest Nontrivial Eigenvalue of a Laplacian, with Tom Leighton and Gary Miller. ICASE Report 97-51, October 1997.

Graph Embedding Techniques for Bounding Condition Numbers of Incomplete Factor Preconditioners. ICASE Report 97-47, September 1997. Submitted to Numerical Linear Algebra with Applications.

Applications of Graph-Theoretical Properties in Algorithms. Ph.D. thesis, School of Computer Science, Carnegie Mellon University. Appeared as Computer Science Technical Report CMU-CS-95-187, September 5, 1995. G.L. Miller, advisor.

A Contraction Procedure for Planar Directed Graphs, with Gary Miller. Appeared as Carnegie Mellon University Computer Science Technical Report CMU-CS-95-100, January 1995.

On the Performance of Spectral Graph Partitioning Methods. Appeared as Carnegie Mellon University Computer Science Technical Report CMU-CS-94-228.

Chromatic Equivalence of Generalized Ladder Graphs, with Gary Haggard and Ronald C. Read. Bucknell University Technical Report 03-1.

INVITED TALKS

Graph Embedding Techniques for Bounding Condition Numbers of Incomplete Factor Preconditioners, Carnegie Mellon Theory Seminar, October 3, 1997.

Graph Embeddings, Eigenvalues, and Pseudoinverses, Mathematics Seminar, University of Connecticut, April 14, 1999.

Spectral Partitioning Methods, Pi Mu Epsilon Lecture, Mathematics Department, Bucknell University, April 20, 1999.