

# Marina A. Epelman

Current as of June 17, 2004

## EDUCATION

- Ph.D. in Operations Research, 1999.  
Massachusetts Institute of Technology, Cambridge, MA  
Dissertation: *Complexity, Condition Numbers, and Conic Linear Systems*  
Advisor: Robert M. Freund
- B.A. in Mathematics, 1995.  
Cornell University, Ithaca, NY  
Magna Cum Laude in Mathematics with Distinction in all subjects.

## PROFESSIONAL EXPERIENCE

- Assistant Professor, Department of Industrial and Operations Engineering University of Michigan (September 1999 – present).

## HONORS

- IOE professor of the year award, 2001/2002 academic year
- Second prize in 2000 George Nicholson Student Paper Competition
- NSF Graduate Research Fellowship, 1996-1999

## COURSES TAUGHT

### *Courses at University of Michigan*

- IOE 518\*, “Introduction to Integer Programming” – Winter 2003, Winter 2004
- IOE 519\*, “Introduction to Nonlinear Programming” – Winter 2003, Winter 2004
- IOE 510, “Linear Programming I” – Fall 2002
- IOE 511, “Continuous Optimization Methods” – Fall 1999, Fall 2001
- IOE 310, “Introduction to Optimization Methods” – Winter 2000, Fall 2000, Winter 2002
- IOE 610, “Linear Programming II” – Winter 2001
- IOE 899, “Seminar in Industrial and Operations Engineering” – Winter 2001
- IOE 202, “Operations Modeling” – Fall 2001, Fall 2002, Winter 2004

### *Other*

- 15.063, “Data, Models, and Decisions” (Sloan Fellows executive education program, MIT; teaching instructor) Summer 1997, 1998, 1999

\* indicates newly developed courses

## STUDENT SUPERVISION

### *Doctoral student advising*

- Blake Nicholson, Ph.D. pre-candidate (co-advisor with Robert L. Smith)
- Shi-Fen Cheng, Ph.D. candidate (committee member)
- Mustafa Sir, Ph.D. pre-candidate (co-advisor with Stephen M. Pollock)
- Julius Atlason, Ph.D. candidate (co-advisor with Shane Henderson), Ph.D. expected Summer 2004, University of Michigan  
Dissertation: "A Simulation-Based Cutting Plane Method for Optimization of Service Systems"
- Theodore Lambert (co-advisor with Robert L. Smith), Ph.D. Fall 2002, University of Michigan  
Dissertation: "Deterministic and Stochastic Systems Optimization"

### *Undergraduate student advising*

- Esra Sisikoglu, BSE 2004
- Mustafa Sir, BSE 2002

### *Doctoral student committee member*

- Tamon Stephen "The distribution of values in combinatorial optimization problems," 2002 (Department of Mathematics)
- Beong Choi, "Theory and algorithms in semidefinite programming," 2001
- Chi-Guhn Lee, "Vehicle routing and inventory control for in-bound logistic," 2001
- Teresa Chu, "A class of strictly semimonotone matrices in linear complementarity theory," 2001

## SPONSORED RESEARCH

### *Funded:*

- PI: "Problem conditioning in convex optimization: theory and algorithms," NSF, 06/15/03-05/31/06, \$177,298
- CO-PI: "Collaborative Research: Complex Networks Optimization," PI: Robert L. Smith, NSF, 09/01/02-08/31/04, \$106,841
- "Optimization of High Dose Conformal Therapy: Incorporation of geometric uncertainties in conformal RT," PI: Benedick Fraass, NIH/NCI, 08/01/01-07/31/05, \$213,427
- PI: Horace H. Rackham School of Graduate Studies Faculty Grant, University of Michigan, 2000, \$15,000

### *Under review:*

- PI: "Fictitious Play for Complex Systems Optimization," with CO-PI Robert L. Smith, submitted to NSF

## PUBLICATIONS

### *Appeared or Accepted*

- Marina A. Epelman, Robert M. Freund, “Condition number complexity of an elementary algorithm for computing a reliable solution of a conic linear system.” *Mathematical Programming* 88(3):451-485, 2000.
- Marina A. Epelman, Robert M. Freund, “A new condition measure, pre-conditioners, and relations between different measures of conditioning for conic linear systems.” *SIAM Journal on Optimization* 12(3):627-655, 2002.
- Júlíus Atlason, Marina A. Epelman and Shane G. Henderson, “Call center staffing with simulation and cutting plane methods.” *Annals of Operations Research* 127:333-358, 2004 (Special Issue on Staff Scheduling and Rostering: Theory and Applications).
- Marina A. Epelman, Stephen Pollock, Brian Netter, and Bobbi Low, “Anisogamy, expenditure of reproductive effort, and the optimality of having two sexes.” To appear in *Operation Research*.
- Theodore Lambert III, Marina A. Epelman, and Robert L. Smith, “A Fictitious Play Approach to Large-Scale Optimization.” To appear in *Operations Research*.
- Marc L. Kessler, Daniel L. Mcshan, Marina A. Epelman, Karen A. Vineberg, Avraham Eisbruch, Theodore S. Lawrence, Benedick A. Fraass, “Costlets: A Generalized Approach to Cost Functions for Automated Optimization of IMRT Treatment Plans.” To appear in *Optimization and Engineering*, special issue on Optimization and Radiation Oncology.

### *Submitted for publication*

- Maciek Nowak, Stephen Pollock, Marina Epelman, “Assignment of Swimmers to Dual Meet Events,” 2003. Submitted to *Computers and Operation Research* (currently under second review).
- Chi-Guhn Lee, Marina Epelman, Chelsea C. White, III, Yavuz Bozer, “A Shortest Path Approach to the Multiple-Vehicle Routing Problem with Split Pick-Ups,” 2003. Submitted to *Transportation Research, Part B* (currently under revision).

### *Conference proceedings*

- Shih-Fen Cheng, Marina A. Epelman and Robert L. Smith, “CoSIGN: A Fictitious Play Algorithm for Coordinated Traffic Signal Control,” 2004. Under review for IEEE International Conference on Intelligent Transportation Systems (ITSC2004) (*refereed proceedings*)
- J. Atlason, M. Epelman and S. G. Henderson, “Using simulation to approximate subgradients of convex performance measures in service systems,” 2003. Proceedings of the 2003 Winter Simulation Conference. S. Chick, P. J. Sanchez, D. Ferrin, and D. J. Morrice, eds. (*refereed proceedings*)
- J. Atlason, M. Epelman and S. G. Henderson, “Combining simulation and cutting plane methods in service systems,” Proceedings of the 2002 National Science Foundation Design, Service and Manufacturing Grantees Conference.

## *Other*

- Theodore J. Lambert, Robert L. Smith, Marina Epelman, “Aggregation is Stochastic Dynamic Programming,” working paper in progress.
- Marina Epelman, “Analysis of Dantzig-Wolfe-based algorithms for well-posed instances fractional packing problems,” working paper in progress.
- Marina Epelman, Robert M. Freund, “Condition Number Complexity of an Elementary Algorithm for Resolving a Conic Linear System,” MIT O.R. Working Paper 319-97, 1997.
- Marina Epelman, “Complexity, Condition Numbers, and Conic Linear Systems,” Ph.D. Thesis, Massachusetts Institute of Technology, 1999.
- Marina Epelman, Georgia Perakis, Tomas L. Magnanti, “Finding Fixed Points by Averaging with Well-Behaved Maps.” MIT O.R. Working Paper 322-97, 1997.
- Theodore J. Lambert, Marina Epelman, Robert L. Smith, “A fictitious play approach to large-scale optimization,” IOE Technical Report 02-01, University of Michigan, July 2002.

## RECENT COLLABORATORS

- Robert M. Freund (Doctoral thesis advisor), MIT
- Shane Henderson, Cornell University
- Theodore J. Lambert, Truckee Meadows Community College
- Thomas Magnanti, MIT
- Georgia Perakis, MIT
- Stephen M. Pollock, UM
- Robert L. Smith, UM
- Chelsea C. White III, Georgia Institute of Technology

## PROFESSIONAL ACTIVITIES AND SERVICE

### *Departmental committees and service:*

- Member, Departmental ad hoc committee on junior faculty mentoring, May 2003 – present
- Operations Research Preliminary Exam coordinator, AY 2003-2004
- Chair, Computing committee, September 2001 – present
- Operations Research curriculum assessment and revision effort leader (with Mark Lewis), AY 2001-2002
- Member, Graduate admissions and financial aid committee, September 2000 – August 2002
- Member, Graduate program committee, September 2000 – present
- Advisor, IOE INFORMS Student Chapter, September 2002 – present

### *College of Engineering:*

- Faculty First Year Advisor, Engineering Advising Center, September 2000 – present

### *University:*

- University and Graduate School Commencement Marshall, 2001, 2003
- Speaker, Rackham-CRLT Seminar on College Teaching, May 20th, 2003

### *Professional:*

- Nonlinear programming invited cluster chair for INFORMS Annual Meeting, Atlanta 2003
- Session organizer, 18th International Symposium on Mathematical Programming, Copenhagen, Denmark, August, 2003
- Session organizer, McMaster Optimization Conference: Theory and Applications, Hamilton, ON, August 2002
- Ad hoc referee for *European Journal of Operations Research*, *Interfaces*, *Linear Algebra and its Applications*, *Management Science*, *Mathematical Programming*, *Mathematics of Operations Research*, *Operations Research Letters*, *SIAM Journal on Optimization*
- Reviewer for *Mathematical Reviews*
- Member of INFORMS, Mathematical Programming Society, SIAM

## PRESENTATIONS

*Invited/Sponsored*

Presented by M.E.

- Marina A. Epelman, Stephen Pollock, Brian Netter, Bobbi Low, *The Optimality of Having Two Sexes*, Carnegie Mellon University, School of Business, Operations Research seminar, December 2003
- Marina A. Epelman, Theodore J. Lambert, and Robert Smith, *A Fictitious Play Approach to Large-Scale Optimization*, INFORMS Annual Meeting, Atlanta, GA, 2003
- Marina A. Epelman, Theodore J. Lambert, and Robert Smith, *Aggregation in Stochastic Dynamic Programming*, 18th International Symposium on Mathematical Programming , Copenhagen, Denmark, August, 2003
- Marina A. Epelman, Stephen Pollock, Brian Netter, *The Optimality of Having Two Sexes*, INFORMS Annual Meeting, San Jose, CA, 2002
- Marina A. Epelman, *The condition number and other measures of conditions in conic convex optimization*, 4th Midwestern Optimization Seminar, Ann Arbor, MI, Sept. 28, 2002.
- Marina A. Epelman, Theodore J. Lambert, and Robert Smith, *A fictitious play algorithm for complex systems analysis*, International Conference on Foundations of Computational Mathematics, Minneapolis, MN, August 2002
- Marina A. Epelman, Julius Atlason, Shane G. Henderson, *Symbiosis of Simulation and Optimization Algorithms in the Context of the Optimal Staffing Problem*, McMaster Optimization Conference: Theory and Applications, Hamilton, ON, August 2002.
- Marina A. Epelman, Julius Atlason, Shane G. Henderson, *Symbiosis of Simulation and Optimization Algorithms in the Context of the Optimal Staffing Problem*, Advanced Optimization Laboratory Seminar, McMaster University, Hamilton, ON, February 2002
- Marina Epelman, *Condition measures for linear and convex programming*, Technion, Haifa, Israel, May, 2000
- Marina Epelman, *Nicholson Student Paper Prize Competition presentation*, INFORMS Salt Lake City, May, 2000
- Marina Epelman, *Measures of Conditioning for Convex Optimization*, INFORMS Salt Lake City, May, 2000
- Marina Epelman, Robert M. Freund, *Pre-conditioners and Relations between Different Condition Measures for Conic Linear Systems*, SIAM Conference on Optimization, Atlanta, GA, May, 1999
- Marina Epelman, *Condition Numbers for Convex Feasibility Problems; Pre-conditioners and Complexity Issues*, FoCM workshop “Complexity of continuous and algebraic mathematics,” Mathematical Sciences Research Institute, November, 1998.
- Marina Epelman, Robert M. Freund, *Relationships and Properties of Condition Numbers for Convex Feasibility Problems*, INFORMS Seattle, October, 1998

- Marina Epelman and Robert M. Freund, *Condition Number Complexity of ‘Elementary’ Algorithms for Convex Feasibility Problems in Conic Form*, INFORMS Montreal, April, 1998
- Marina Epelman, Robert M. Freund, *Complexity of Iterative Algorithms for Linear and Semidefinite Programming Based on Condition Algorithms*, INFORMS San Diego, May, 1997

Presented by co-authors

- Maciek Nowak, Marina Epelman, Stephen Pollock, *Assignment of Swimmers to Dual Meet Events*, INFORMS Annual Meeting, Atlanta, GA, 2003
- Julius Atlason, Marina A. Epelman, Shane G. Henderson, *Combining Simulation and Optimization in Service Systems*, INFORMS Annual Meeting, San Jose, CA, 2002
- Julius Atlason, Marina A. Epelman, Shane G. Henderson, *Verifying and Exploiting Convexity in Simulation Optimization*, INFORMS Annual Meeting, 2001
- Robert M. Freund, Marina Epelman, *Generalizing Condition Measures to Non-Conic Convex Problems*, INFORMS Cincinnati, May, 1999.
- Thomas L. Magnanti, Georgia Perakis, Marina Epelman, *Averaging with Well-Behaved Maps for Solving Fixed Points and Variational Inequalities*, INFORMS Dallas, October, 1997

*Contributed*

Presented by M.E.

- Marina A. Epelman, Robert L. Smith, Theodore J. Lambert, and Shih-Fen Cheng, *A fictitious play approach to large-scale complex systems optimization*, International Conference on Complex Systems, Quincy, MA, 2004
- Marina A. Epelman, Julius Atlason, Shane G. Henderson, *Symbiosis of Simulation and Optimization Algorithms in the Context of the Optimal Staffing Problem*, 2002 SIAM Conference on Optimization, Toronto, May 2002
- Marina A. Epelman, Chi-Guhn Lee, Chelsea C. White, *A Shortest Path Approach to Multi-Vehicle Routing with Split Demand*, INFORMS Annual Meeting, 2000
- Marina Epelman, Robert M. Freund, *Complexity of improving the conditioning of convex feasibility problems*, International Mathematical Programming Symposium, Atlanta, August, 2000
- Marina Epelman, *Measures Of Conditioning For Fractional Packing Problems: Dantzig-Wolfe Type Algorithms*, INFORMS Philadelphia, November, 1999

Presented by co-authors

- Julius Atlason, Marina A. Epelman, Shane G. Henderson, *Call Center Staffing with Simulation and Cutting Plane Methods*, INFORMS Annual Meeting, Atlanta, GA, 2003
- Theodore J. Lambert, Robert Smith, Marina A. Epelman, *A Fictitious Play Approach to Large Scale Optimization*, INFORMS Annual Meeting 2002

- Maciek Nowak, Stephen Pollock, Marina Epelman, *A Technique for the Assignment of Swimmers to Meet Events*, INFORMS Annual Meeting 2002
- Theodore J. Lambert, Marina A. Epelman, and Robert Smith, *A fictitious play approach to optimization*, 2002 SIAM Conference on Optimization, Toronto, May 2002
- Chi-Guhn Lee, Marina Epelman, Chelsea C. White, III, Yavuz Bozer, *Shortest Path Approach to the Multiple-Vehicle Routing Problem with Split Pick-ups*, 17th International Symposium on Mathematical Programming , Atlanta, August, 2000