

Marina A. Epelman

Current as of September 28, 2009

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

- Associate Professor, Department of Industrial and Operations Engineering, University of Michigan (September 2005 – present).
- Assistant Professor, Department of Industrial and Operations Engineering, University of Michigan (September 1999 – August 2005).

VISITING POSITIONS

- Visiting Scientist, Sloan School of Management, Massachusetts Institute of Technology, Spring 2007.
- Visiting Professor, School of Operations Research and Industrial Engineering, Cornell University, Fall 2006.

HONORS

- IOE professor of the year award, 2001/2002 academic year. Awarded by the Alpha Pi Mu student society for teaching (primarily at the undergraduate level).
- Second prize, INFORMS George Nicholson Student Paper Competition, “Measures of Conditioning and Pre-Conditioners for Conic Linear Systems,” 2000
- NSF Graduate Research Fellowship, 1996-1999

COURSES TAUGHT

Courses at University of Michigan: (* indicates newly developed courses)

Undergraduate

- IOE 202, “Operations Modeling”
- IOE 310, “Introduction to Optimization Methods”

Graduate

- IOE 518*, “Introduction to Integer Programming”
- IOE 519*, “Introduction to Nonlinear Programming”
- IOE 510, “Linear Programming I”
- IOE 511, “Continuous Optimization Methods”
- IOE 610, “Linear Programming II”
- IOE 611/MATH 663, “Nonlinear Programming”

- IOE 899, “Seminar in Industrial and Operations Engineering”

Other

- 15.094, “Systems Optimization: Models and Computation” (Massachusetts Institute of Technology)
- ENGRI 115, “Engineering Applications of ORIE” (Cornell University)
- 15.063, “Data, Models, and Decisions” (Sloan Fellows executive education program, MIT; teaching instructor)

STUDENT SUPERVISION

Doctoral student advising

- Fei Peng, Ph.D. pre-candidate (co-advisor with H. Edwin Romeijn)
- Stanko Dimitrov, Ph.D. candidate (co-advisor with Rahul Sami)
- Esra Sisikoglu, , Ph.D. in IOE, 2009, University of Michigan
Dissertation: “Distributed Algorithms Based on Fictitious Play for Near Optimal Sequential Decision Making” (co-advisor with Robert L. Smith)
- Tara Terry, Ph.D. in IOE, 2009, University of Michigan
Dissertation: “Robust Linear Optimization with Recourse: Solution Methods and Other Properties”
- Blake Nicholson, Ph.D. in IOE, 2008, University of Michigan
Dissertation: “Scheduling Shutdowns for Manufacturing Systems with an Application to Automotive Production Lines: Optimization Models and Computation” (co-advisor with Robert L. Smith)
- Mustafa Sir, Ph.D. in IOE, 2007, University of Michigan
Dissertation: “Optimization of Radiotherapy Considering Uncertainties Caused by Daily Setup Procedures and Organ Motion” (co-advisor with Stephen M. Pollock)
- Júlíus Atlason, Ph.D. in IOE, 2004, University of Michigan
Dissertation: “Simulation-Based Cutting Plane Methods for Optimization of Service Systems” (co-advisor with Shane G. Henderson, Cornell University)
- Theodore Lambert, Ph.D. in IOE, 2002, University of Michigan
Dissertation: “Deterministic and Stochastic Systems Optimization” (co-advisor with Robert L. Smith)

Undergraduate student advising

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

Doctoral student committee member

- Ada Barlatt, “Models and Algorithms For Workforce Allocation and Utilization,” 2009
- Irina Dolinskaya, “Optimal Path Finding for Direction, Time and Space Dependent Costs, with Application to Vessel, UAV and Robot Routing,” 2009
- Manjunath Kudlur, “Streamrooler: a Unified Compilation and Synthesis System for Streaming Applications,” 2008 (Department of EECS)
- Shervin AhmadBeygi, “Airline Planning Under Uncertainty,” 2008
- Sarah Root, “Models and algorithms for addressing complex constraints and objective functions,” 2007

- Archis Ghate, “Markov Chains, Game Theory, and Infinite Programming: Three Paradigms for Optimization of Complex Systems,” 2006
- Shi-Fen Cheng, “Game-Theoretic Approaches for Complex Systems Optimization,” 2006
- 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

- PI: “Collaborative Research: Approximate Fictitious Play for the Optimization of Complex Systems,” NSF, 8/1/08—7/31/10, \$116,566.00
- PI: “Fictitious Play for Complex Systems Optimization,” CO-PI: Robert L. Smith, NSF, 08/15/04—08/31/08, \$215,907
- PI: “Problem conditioning in convex optimization: theory and algorithms,” NSF, 06/15/03—05/31/07, \$177,298
- CO-PI: “Collaborative Research: Complex Networks Optimization,” PI: Robert L. Smith, NSF, 09/01/02—08/31/05, \$106,841
- Participating Investigator: “Optimization of High Dose Conformal Therapy: Incorporation of geometric uncertainties in conformal RT,” PI: Benedick Fraass, NIH/NCI, 08/01/01—07/31/10.
- PI: Horace H. Rackham School of Graduate Studies Faculty Grant, University of Michigan, 2000, \$15,000

PUBLICATIONS

Archival journals (appeared, accepted, or submitted)

For accepted and submitted papers, the date corresponds to the latest significant revision

- 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.” *Operations Research*, 53(3):560-567, 2005
- Theodore Lambert III, Marina A. Epelman, and Robert L. Smith, “A Fictitious Play Approach to Large-Scale Optimization.” *Operations Research* 53(3):477-489, 2005
- 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,” *Optimization and Engineering*, special issue on Optimization and Radiation Oncology, 6(4):421 - 448, 2005
- Maciek Nowak, Marina Epelman, Stephen Pollock, “Assignment of Swimmers to Dual Meet Events,” *Computers and Operations Research*, special issue on OR in Sport, 33(7):1951-1962, 2006
- 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,” *Transportation Research, Part B* 40(4):265-284, 2006
- Mustafa Y. Sir, Stephen M. Pollock, Marina A. Epelman, Kwok L. Lam and Randall K. Ten Haken, “Ideal spatial radiotherapy dose distributions subject to positional uncertainties,” *Phys. Med. Biol.* 51(24):6329-6347, 2006

- Shih-Fen Cheng, Marina A. Epelman and Robert L. Smith, “CoSIGN: A Parallel Algorithm for Coordinated Traffic Signal Control,” *IEEE Transactions on Intelligent Transportation Systems*, 7(4): 551-564, 2006
- Júlíus Atlason, Marina A. Epelman and Shane G. Henderson, “Optimizing call center staffing using simulation and analytic center cutting plane methods.” *Management Science* 54:295-309, 2008
- Shih-Fen Cheng, Blake E. Nicholson, Marina A. Epelman, Daniel J. Reaume, Robert L. Smith. “A Dynamic Programming Approach to Achieving an Optimal End State Along a Serial Production Line,” 2009, Submitted
- Marina A. Epelman, Archis Ghate and Robert L. Smith, “Sampled Fictitious Play for Approximate Dynamic Programming,” 2009, Under second review
- Mustafa Y. Sir, Marina A. Epelman and Stephen M. Pollock, “Stochastic programming for off-line adaptive radiotherapy, 2009, Under second review
- Aurélie Thiele, Tara Terry, and Marina A. Epelman, “Robust Linear Optimization With Recourse,” 2009, Submitted
- Stanko Dimitrov, Marina A. Epelman, Dushyant Sharma, “New Models of Network Routing under Active Congestion Control,” 2009, Submitted

Conference 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*. (Non-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. IEEE. (Refereed proceedings)

Technical reports, working papers, etc.

- Marina Epelman, “Comments on: intensity modulated radiation therapy treatment plan optimization.” *TOP* 16:244-245, 2008.
- 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. (Extensive revision published in *Mathematical Programming*.)
- Marina Epelman, Georgia Perakis, Thomas L. Magnanti, “Finding Fixed Points by Averaging with Well-Behaved Maps.” MIT O.R. Working Paper 322-97, 1997.
- Marina Epelman, “Complexity, Condition Numbers, and Conic Linear Systems,” Ph.D. Thesis, Massachusetts Institute of Technology, 1999.

PROFESSIONAL ACTIVITIES AND SERVICE

Departmental committees and service activities:

- Member, Graduate admissions and financial aid committee, September 2000 – August 2002
- Member, Graduate program committee, September 2000 – August 2005
- Chair, Computing committee, September 2001 – present
- Advisor, UofM INFORMS Student Chapter, September 2002 – present
- Chair, Curriculum committee, September 2007 – present (member since September 2005)
- Member, Katta Murty Prize for Best Research Paper on Optimization by an IOE Student jury, 2007 – present
- Operations Research area coordinator, AY 2003-2004, 2008-2009

College of Engineering:

- Faculty Advisor, Engineering Advising Center, September 2000 – present
- Member, College Curriculum Committee, September 2007 – present
- Chair, College Curriculum Committee, September 2009 – present

University:

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

Professional:

- Treasurer and Secretary, INFORMS Optimization Society, 2008-2010
- Associate Editor, *Operations Research*, 2006-present
- Member, Nicholson student paper competition jury, 2006-2007, 2009-2010
- Session organizer, 19th International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, August, 2006
- Cluster chair for invited sessions on Linear/Nonlinear Programming at INFORMS Annual Meeting, New Orleans/San Francisco, October 2005
- Mini-symposium organizer, SIAM Conferences on Optimization, 2005, 2008
- Cluster chair for invited sessions on Nonlinear Programming at INFORMS Annual Meeting, Atlanta, GA, October 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 *Annals of OR*, *European Journal of Operations Research*, *Interfaces*, *Linear Algebra and its Applications*, *Management Science*, *Mathematical Programming*, *Mathematics of Operations Research*, *Naval Research Logistics*, *Operations Research Letters*, *SIAM Journal on Optimization*
- Reviewer for *Mathematical Reviews*
- Member of INFORMS, Mathematical Programming Society, SIAM

PRESENTATIONS

Invited/Sponsored

Presented by M. Epelman

- Marina A. Epelman, *Sampled Fictitious Play algorithms for complex optimization problems*, ORIE seminar series, UT Austin, Austin, TX, September 2009
- Marina A. Epelman, Mustafa Sir, and Stephen Pollock, *Off-Line Adaptive Radiation Therapy*, INFORMS Annual Meeting, Washington, DC, October 2008
- Marina A. Epelman, Mustafa Sir, and Stephen Pollock, *Control Policies for Off-Line Adaptive Radiation Therapy*, 2008 SIAM Conference on Optimization, Boston, MA, May 2008
- Marina A. Epelman, *Sampled Fictitious Play algorithms for complex optimization problems*, Massachusetts Institute of Technology, LIDS seminar, March, 2007
- Marina A. Epelman, Archis Ghatge, Robert L. Smith, *Sampled Fictitious Play Heuristics for Discrete Optimization Problems*, INFORMS Annual Meeting, Pittsburgh, PA, November 2006
- Marina A. Epelman, Archis Ghatge, Robert L. Smith, *Sampled fictitious play algorithms for large-scale DPs and MDPs*, 19th International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, August, 2006
- Marina A. Epelman, *Sampled Fictitious Play Algorithms for Discrete Optimization Problems*, Lehigh University, ISE seminar series, February, 2006
- Marina A. Epelman, Robert L. Smith, Shih-Fen Cheng, *A Fictitious Play Heuristic for Complex Systems Optimization*, 2005 SIAM Conference on Optimization, Stockholm, Sweden, May 2005
- Marina A. Epelman, Júlíus Atlason, Shane G. Henderson, *Optimizing Call Center Staffing using Simulation and Analytic Center Cutting Plane Methods*, Optimization and Applications workshop at Mathematisches Forschungsinstitut Oberwolfach, Germany, January 2005 (extended abstract to appear in “Oberwolfach Reports” series).
- Marina A. Epelman, *The Optimality of Having Two Sexes*, University of Michigan, IOE, Seminar in IOE, February 2004
- Marina A. Epelman, *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, October 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, November 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, Júlíus 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, Júlíus 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, UT, May, 2000
- Marina Epelman, *Measures of Conditioning for Convex Optimization*, INFORMS Salt Lake City, UT, 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, WA, 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, CA, May, 1997

Presented by co-authors

- Stanko Dimitrov, Marina A. Epelman, Dushyant Sharma, *Network Routing under Active Congestion Control: Theory and Practice*, INFORMS Annual Meeting, Washington, DC, October 2008
- Shih-Fen Cheng, Marina A. Epelman, Robert L. Smith, *A Parallel Algorithm for Dynamic Routing and Intersection Control*, INFORMS Annual Meeting, Seattle, WA, November 2007
- Stanko Dimitrov, Marina A. Epelman, Dushyant Sharma, *Internet Routing Under Active Congestion Control*, INFORMS Annual Meeting, Seattle, WA, November 2007
- Blake E. Nicholson, Marina A. Epelman, Robert L. Smith, *Optimal Control of a Production Line Under Uncertainty with a Finite Horizon*, INFORMS Annual Meeting, Seattle, WA, November 2007
- Mustafa Y. Sir, Stephen Pollock, Marina A. Epelman, *Suboptimal Control Policies for Adaptive Radiotherapy*, INFORMS Annual Meeting, Seattle, WA, November 2007
- Mustafa Y. Sir, Stephen Pollock, Marina A. Epelman, Randall Ten Haken, *Sharp and Blurred IMRT Margins: Dependence on Treatment Loss Functions*, 2005 SIAM Conference on Optimization, Stockholm, Sweden, May 2005
- Júlíus Atlason, Marina Epelman, Shane Henderson, *Staffing Call Centers using Simulation and an Analytic Center Cutting Plane Method*, INFORMS Annual Meeting, Denver, CO, October 2004
- Mustafa Sir, Marina A. Epelman and Stephen M. Pollock, *Incorporating Patient Set-up Uncertainties in Optimization of IMRT*, INFORMS Annual Meeting, Denver, CO, October 2004

- Shih-Fen Cheng, Marina A. Epelman and Robert L. Smith, *CoSIGN: A Fictitious Play Algorithm for Coordinated Traffic Signal Control*, INFORMS Annual Meeting, Denver, CO, October 2004
- Júlíus Atlason, Marina Epelman, Shane Henderson, *Using Simulation to Approximate Subgradients of Convex Performance Measures in Service Systems*, Winter Simulation Conference, December, 2003.
- Maciek Nowak, Marina Epelman, Stephen Pollock, *Assignment of Swimmers to Dual Meet Events*, INFORMS Annual Meeting, Atlanta, GA, October 2003
- Júlíus Atlason, Marina A. Epelman, Shane G. Henderson, *Combining Simulation and Optimization in Service Systems*, INFORMS Annual Meeting, San Jose, CA, November 2002
- Júlíus Atlason, Marina A. Epelman, Shane G. Henderson, *Verifying and Exploiting Convexity in Simulation Optimization*, INFORMS Annual Meeting, Miami, FL, 2001
- Robert M. Freund, Marina Epelman, *Generalizing Condition Measures to Non-Conic Convex Problems*, INFORMS Cincinnati, OH, May, 1999.
- Thomas L. Magnanti, Georgia Perakis, Marina Epelman, *Averaging with Well-Behaved Maps for Solving Fixed Points and Variational Inequalities*, INFORMS Dallas, TX, October, 1997

Contributed

Presented by M. Epelman

- Marina A. Epelman, Fei Peng, H. Edwin Romeijn, Mustafa Y. Sir, *Optimization Models for Radiation Therapy under Uncertainty*, 20th ISMP, Chicago, IL, August 2009
- Marina A. Epelman, Stephen M. Pollock, Mustafa Y. Sir, *Off-line Adaptive Radiation Therapy*, INFORMS Annual Meeting, Washington DC, October 2008
- Marina A. Epelman, *Control policies for off-line adaptive radiation therapy*, ICCOPT/MOFTA, Hamilton, ON, August 2007
- Marina A. Epelman, Júlíus Atlason, Shane G. Henderson, *Optimizing Call Center Staffing using Simulation and Analytic Center Cutting Plane Methods*, 2005 SIAM Conference on Optimization, Stockholm, Sweden, May 2005
- 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, May 2004
- Marina A. Epelman, Júlíus Atlason, Shane G. Henderson, *Symbiosis of Simulation and Optimization Algorithms in the Context of the Optimal Staffing Problem*, 2002 SIAM Conference on Optimization, Toronto, ON, May 2002
- Marina A. Epelman, Chi-Guhn Lee, Chelsea C. White, *A Shortest Path Approach to Multi-Vehicle Routing with Split Demand*, INFORMS San Antonio, TX, November 2000
- Marina Epelman, Robert M. Freund, *Complexity of improving the conditioning of convex feasibility problems*, International Mathematical Programming Symposium, Atlanta, GA, August, 2000
- Marina Epelman, *Measures Of Conditioning For Fractional Packing Problems: Dantzig-Wolfe Type Algorithms*, INFORMS Philadelphia, PA, November, 1999

Presented by co-authors

- Esra Sisikoglu, Marina A. Epelman, Robert L. Smith, *Sampled Fictitious Play for Solving Large-Scale Dynamic Programming Problems*, INFORMS Annual Meeting, Washington, DC, October 2008

- Stanko Dimitrov, Marina A. Epelman, Dushyant Sharma, *Internet Routing Under Active Congestion Control*, INFORMS Annual Meeting, Pittsburgh, PA, November 2006
- Júlíus Atlason, Marina A. Epelman, Shane G. Henderson, *Call Center Staffing with Simulation and Cutting Plane Methods*, INFORMS Annual Meeting, Atlanta, GA, October 2003
- Theodore J. Lambert, Robert Smith, Marina A. Epelman, *A Fictitious Play Approach to Large Scale Optimization*, INFORMS Annual Meeting, San Jose, CA, November 2002
- Maciek Nowak, Stephen Pollock, Marina Epelman, *A Technique for the Assignment of Swimmers to Meet Events*, INFORMS Annual Meeting, San Jose, CA, November 2002
- Theodore J. Lambert, Marina A. Epelman, and Robert Smith, *A fictitious play approach to optimization*, 2002 SIAM Conference on Optimization, Toronto, ON, 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, GA, August, 2000