

Juan Pablo Vielma
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Research Interest

- Theory and Technology for Linear, Non-linear and Stochastic Mixed Integer Programming.
- Optimization Models in Sustainable Natural Resource Management and Environmental Protection.

Education

- PH.D. INDUSTRIAL ENGINEERING 2009.
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology. Atlanta, GA. USA.
- MATHEMATICAL ENGINEERING TITLE (MASTERS EQUIVALENT) 2003.
Department of Mathematical Engineering.
Universidad de Chile. Santiago, Chile.
- BACHELOR IN ENGINEERING SCIENCES, MAJOR IN MATHEMATICS 2002.
Department of Mathematical Engineering.
Universidad de Chile. Santiago, Chile.

Professional Positions Held

- TENURE TRACK ASSISTANT PROFESSOR September, 2010 – Present.
Department of Industrial Engineering
University of Pittsburgh. Pittsburgh, PA. USA.
- VISITING ASSISTANT PROFESSOR September, 2009 – August, 2010.
Department of Industrial Engineering
University of Pittsburgh. Pittsburgh, PA. USA.
- HERMAN GOLDSTINE POSTDOCTORAL FELLOW August, 2009 – August, 2010
IBM Research
Yorktown Heights, NY.
- GRADUATE RESEARCH ASSISTANT January, 2004 – July, 2009.
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology. Atlanta, GA. USA. Technology. Atlanta, GA. USA.
- SUMMER INTERN Summer, 2006.
CPLEX R&D
ILOG, Inc. Atlanta, GA. USA.
- DISSERTATION RESEARCH September, 2001 – December, 2003.
Mathematical and Industrial Engineering Departments
University of Chile. Santiago, Chile.

Publications

PEER REVIEWED JOURNAL ARTICLES

- J-1 “*Mixed integer linear programming formulations for probabilistic constraints*”. J. P. Vielma, S. Ahmed and G. Nemhauser. To appear in *Operations Research Letters*, 2012.
- J-2 “*Fitting piecewise linear continuous functions*”. A. Toriello and J. P. Vielma. *European Journal of Operational Research* 219, 2012. pp. 86–95.
- J-3 “*An integer linear programming approach for bilinear integer programming*”. A. S. Freire, E. Moreno and J. P. Vielma. *Operations Research Letters* 40, 2012. pp. 74–77.
- J-4 “*The Chvátal-Gomory closure of a strictly convex body*”. D. Dadush, S. S. Dey and J. P. Vielma. *Mathematics of Operations Research* 36, 2011. pp. 227–239.
- J-5 “*The split closure of a strictly convex body*”. D. Dadush, S. S. Dey and J. P. Vielma. *Operations Research Letters* 39, 2011. pp. 121–126.
- J-6 “*Modeling disjunctive constraints with a logarithmic number of binary variables and constraints*”. J. P. Vielma and G. Nemhauser. *Mathematical Programming* 128, 2011. pp. 49–72.
- J-7 “*A note on ‘A superior representation method for piecewise linear functions’*”. J. P. Vielma, S. Ahmed and G. Nemhauser. *INFORMS Journal on Computing* 22, 2010. pp. 493–497.
- J-8 “*Mixed-integer models for nonseparable piecewise linear optimization: unifying framework and extensions*”. J. P. Vielma, S. Ahmed and G. Nemhauser. *Operations Research* 58, 2010. pp. 303–315.
- J-9 “*Evaluating alternative approaches for solving the area restriction model in harvest scheduling*”. M. Goycoolea, A. Murray, J. P. Vielma and A. Weintraub. *Forest Science* 55, 2009. pp. 149–165.
- J-10 “*A lifted linear programming branch-and-bound algorithm for mixed integer conic quadratic programs*”. J. P. Vielma, S. Ahmed and G. Nemhauser. *INFORMS Journal on Computing* 20, 2008. pp. 438–450.
- J-11 “*Nonconvex, lower semicontinuous piecewise linear optimization*”. J. P. Vielma, A. Keha and G. Nemhauser. *Discrete Optimization* 5, 2008. pp. 467–488.
- J-12 “*A constructive characterization of the split closure of a mixed integer linear program*”. J. P. Vielma. *Operations Research Letters* 35, 2007. pp. 29–35.
- J-13 “*Improving computational capabilities for addressing volume constraints in forest harvest scheduling problems*”. J. P. Vielma, A. Murray, D. Ryan and A. Weintraub. *European Journal of Operational Research* 176, 2007. pp. 1246–1264.

PEER REVIEWED CONFERENCE PROCEEDING ARTICLES

- P-1 “*On the Chvátal-Gomory Closure of a compact convex set*”. D. Dadush, S. S. Dey and J. P. Vielma. *Proceedings of the 15th Conference on Integer Programming and Combinatorial Optimization (IPCO 2011)*, Lecture Notes in Computer Science Vol. 6655 (O. Günlük and G. J. Woeginger, editors), 2011. pp. 130–142.
- P-2 “*The Chvátal-Gomory closure of an ellipsoid is a polyhedron*”. S. S. Dey and J. P. Vielma. *Proceedings of the 14th Conference on Integer Programming and Combinatorial Optimization (IPCO 2010)*, Lecture Notes in Computer Science Vol. 6080 (F. Eisenbrand and F. B. Shepherd, editors), 2010. pp. 327–340.
- P-3 “*Risk control in ultimate pits using conditional simulations*”. J. P. Vielma, D. Espinoza and E. Moreno. *Proceedings of the 34th International Symposium on Application of Computers and Operations Research in The Mineral Industry (APCOM 2009)*, 2009. pp. 107–114.

- P-4 “*Modeling disjunctive constraints with a logarithmic number of binary variables and constraints*”. J. P. Vielma and G. Nemhauser. Proceedings of the 13th Conference on Integer Programming and Combinatorial Optimization (IPCO 2008), Lecture Notes in Computer Science Vol. 5035 (A. Lodi, A. Panconesi and G. Rinaldi, editors), 2008. pp. 199–213.
- P-5 “*Improved solution techniques for multi-period area-based forest harvest scheduling problems*”. J. P. Vielma, A. Murray, D. Ryan and A. Weintraub. Proceedings of the 10th Symposium for Systems Analysis in Forest Resources (SSAFR’03), USDA Forest Services General Technical Report PNW-GTR-656 (M. Bevers and T.M. Barrett, editors), 2005. pp. 285–290.

OTHER PUBLICATIONS

- O-1 “*Mixed integer programming approaches for nonlinear and stochastic programming*”. J. P. Vielma. Ph.D. Thesis, H. Milton Stewart School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA, 2009.
- O-2 “*Comparing alternative formulations for the ARM*”. J. P. Vielma, M. Goycoolea, A. Murray and A. Weintraub. To appear in Proceedings of the 12th Symposium for Systems Analysis in Forest Resources (SSAFR’06), 2006.
- O-3 “*Restricciones de volumen elásticas para un problema de planificación forestal con restricciones de área en múltiples períodos*”. J. P. Vielma. Mathematical Engineering Thesis (In Spanish), Department of Mathematical Engineering, University of Chile, Santiago, Chile, 2003.
- O-4 “*Improved solution techniques for multi-period area-based forest harvest scheduling problems*”. J. P. Vielma, A. Murray, D. Ryan and A. Weintraub. Proceedings of the 38th Annual Conference of the Operational Research Society of New Zealand (ORSNZ’03), 2003. pp. 21–28.

SUBMITTED

- S-1 “*Imposing connectivity constraints in forest planning models*”. R. Carvajal, M. Constantino, M. Goycoolea, J. P. Vielma and A. Weintraub. Submitted for publication, 2011.
- S-2 “*Computational experiments with cross and crooked cross cuts*”. S. Dash, O. Günlük and J. P. Vielma. Submitted for publication, 2011.
- S-3 “*Strong dual for conic mixed-integer programs*”. D. Morán, S. S. Dey and J. P. Vielma. Submitted for publication, 2011.
- S-4 “*On the Chvátal-Gomory closure of a compact convex set*”. D. Dadush, S. S. Dey and J. P. Vielma. Submitted for publication, 2011.

Presentations and Posters

- *“Cutting planes and elementary closures for non-linear integer programming”*.
 - DIMACS Interdisciplinary Series, Rutgers University, Piscataway, NJ, November 2011.
- *“The Chvátal-Gomory closure of a compact convex body is a rational polytope”*.
 - SIAM Conference on Optimization, Darmstadt, Germany, May 2011.
- *“Robustness and recourse for the open-pit problem”*.
 - Universidad de Antofagasta, Antofagasta, Chile, March, 2011 (In Spanish).
- *“Integer programming approaches for imposing connectivity in forest management”*.
 - 14th Symposium for Systems Analysis in Forest Resources (SSAFR 2010), Maitencillo, Chile, March, 2011 (Semi-Plenary).
- *“The Chvátal-Gomory closure of a strictly convex body is a polyhedron”*.
 - IP for Lunch, IBM Thomas J. Watson Research Center, Yorktown Heights, New York, March 2010.
 - Mixed Integer Programming Workshop, Atlanta, GA, July 2010.
 - INFORMS Annual Meeting, Austin, TX, November 2010.
- *“Risk control in ultimate pits using conditional simulations”*.
 - 34th International Symposium on Application of Computers and Operations Research in The Mineral Industry, Vancouver, Canada, October 2009.
- *“Imposing old-growth patch constraints in forest harvest scheduling models”*.
 - Department of Industrial Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania, September 2009.
 - INFORMS Annual Meeting, San Diego, CA, October 2009.
- *“Mixed integer programming models for non-separable piecewise linear cost functions”*.
 - INFORMS Annual Meeting, Washington, DC, October 2008.
 - Georgia Institute of Technology, ISyE DOS Optimization Seminars, Atlanta, Georgia, October 2008.
 - Department of Industrial Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania, December 2008.
 - School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, Georgia, March 2009.
- *“Modeling disjunctive constraints with a logarithmic number of binary variables and constraints”*.
 - Georgia Institute of Technology, ISyE DOS Optimization Seminars, Atlanta, Georgia, April 2008.
 - 13th Conference on Integer Programming and Combinatorial Optimization, Bertinoro, Italy, May 2008.
 - Workshop on Mixed Integer Programming, New York, New York, August 2008 (Poster).
 - INFORMS Annual Meeting, Washington, DC, October 2008.
 - 20th International Symposium on Mathematical Programming, Chicago, Illinois, August 2009.
- *“A lifted linear programming branch-and-bound algorithm for mixed integer conic quadratic programs”*.
 - Georgia Institute of Technology, ISyE Integer Programming Seminars, Atlanta, Georgia, February 2007.
 - Workshop on Mixed Integer Programming, Montréal, Canada, July 2007 (Poster).
 - INFORMS Annual Meeting, Seattle, Washington, November 2007.
 - Optimization Society Student Paper Prize, INFORMS Annual Meeting, Seattle, Washington, November 2007.
 - INFORMS Optimization Society Annual Meeting, Atlanta, Georgia, March 2008.
 - Bellairs Workshop on Integer Programming, Holetown, Barbados, March 2008.
 - SIAM Conference on Optimization, Boston, Massachusetts, May 2008.
 - Universidad Adolfo Ibañez, Santiago, Chile, July 2008 (In Spanish).

- “*Economic and fragmentation effects of multiple adjacencies in the area restriction model*”.
 - INFORMS Annual Meeting, Seattle, Washington, November 2007.
- “*Polyhedral aspects of nonconvex, lower semicontinuous piecewise linear optimization*”.
 - INFORMS Annual Meeting, Pittsburgh, Pennsylvania, November 2006.
- “*GreenUp and adjacency issues in forest spatial harvesting*”.
 - INFORMS Annual Meeting, Pittsburgh, Pennsylvania, November 2006.
- “*A constructive characterization of the split closure of a mixed integer linear program*”.
 - Workshop on Mixed Integer Programming, Coral Gables, Florida, June 2006 (Poster).
 - 19th International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, July 2006.
 - Georgia Institute of Technology, ISyE Integer Programming Seminars, Atlanta, Georgia, October 2006.
 - Georgia Institute of Technology, ACO Student Seminar, Atlanta, Georgia, November 2008.
- “*Comparing two formulations for the ARM problem*”.
 - 12th Symposium for Systems Analysis in Forest Resources, Burlington, Vermont, September 2006.
- “*Comparison of methodologies for limiting opening sizes in forest harvest scheduling*”.
 - INFORMS Annual Meeting, San Francisco, California, November 2005.
- “*Improved solution techniques for multi-period area-based forest harvest scheduling problems*”.
 - 38th Annual Conference of the Operational Research Society of New Zealand, Hamilton, New Zealand, November 2003.
 - V Chilean Operational Research Conference, Valparaiso, Chile, September 2003 (In Spanish).
- “*An exact algorithm for the area restriction model*”.
 - Symposium on Models and Systems in Forestry, Punta de Tralca, Chile, March 2002 (with Andres Weintraub).

Funded Research Proposals

PEER-REVIEWED GRANTS

- Vielma, J. P. (PI). “Collaborative Research: Fundamentals of Convex Mixed Integer Nonlinear Programming”. National Science Foundation Grant CMMI-1030662. \$200,000. September 1, 2010 – August 31, 2013.
- J. P. Vielma (PI), S. Dash and O. Günlük. “Crooked Cross Cuts for Linear and Nonlinear Mixed Integer Programming”. Office of Naval Research Grant N000141110724. \$55,502. July 1, 2011 – June 30, 2012.

Contributions to Teaching

COURSES TAUGHT (ALL UNIVERSITY OF PITTSBURGH UNLESS OTHERWISE NOTED)

- IE 3088, *Integer Programming*, Fall 2011.
- IE 3080, *Conic Programming*, Fall 2011.
- IE 3080, *Robust Optimization*, Fall 2010.
- ISyE 3133 (Georgia Institute of Technology), *Engineering Optimization*, Spring 2008.

COURSES DEVELOPED

- IE 3088, *Integer Programming*, University of Pittsburgh.
- IE 3080, *Robust Optimization*, University of Pittsburgh.

SHORT COURSES AND TUTORIALS

- “Mixed integer linear programming formulation techniques”, 1 day course at Department of Chemical Engineering, University of Antofagasta. March, 2011.
- “Robust Optimization for Risk Control in Enterprise-wide Optimization”, Enterprise-wide Optimization Seminar, Department of Chemical Engineering, Carnegie Mellon University. April, 2011.

Supervising and Committee Membership

PHD STUDENTS SUPERVISED

- Sina Modaresi, in progress.

DOCTORAL COMMITTEES

- Andrew C. Trapp, *On Solving Selected Nonlinear Integer Programming Problems in Data Mining, Computational Biology, and Sustainability*, Department of Industrial Engineering, University of Pittsburgh. March, 2011.
- Sebastian Terrazas Moreno, *Decomposition Strategies for the Optimal Design of Integrated Sites and Multi-Site Planning and Scheduling*, Chemical Engineering Department, Carnegie Mellon University. April, 2011.
- Osman Y. Özaltn, *Optimal Design of the Annual Influenza Vaccine*, Department of Industrial Engineering, University of Pittsburgh. July, 2011.
- Sakine Batun, *Scheduling Multiple Operating Rooms Under Uncertainty*, Department of Industrial Engineering, University of Pittsburgh. November, 2011.
- Sumit Mitra, *Multi-scale Demand-Side Management for Continuous Power-intensive Processes*, Chemical Engineering Department, Carnegie Mellon University. Fall 2012 (Expected).

POST-DOCTORAL FELLOWS SUPERVISED

- Mustafa R. Kılınç, April 2011–Present. Co-supervised with A. Schaefer.

STUDENT AWARDS BY CO-AUTHORS

- Daniel Dadush, 2011 INFORMS Optimization Society Student Paper Prize for “On the Chvátal-Gomory closure of a compact convex set”.

OTHER

- Guido Lagos, visiting Masters student from University of Chile, April 2011, host.
- Nathalie Jamett Guillier, Member of Qualifying Exam Committee for Ph.D. in Minerals Processing, Department of Chemical Engineering, University of Antofagasta, June, 2011.
- Gonzalo Muñoz, visiting Masters student from University of Chile, November 2011, host.

Honors and Awards

- Finalist for the 2010 and 2011 INFORMS Junior Faculty Interest Group Paper Competition.
- IBM Herman Goldstine Postdoctoral Fellowship, 2009.
- “Thank a Teacher” recognition from the Center for the Enhancement of Teaching and Learning of the Georgia Institute of Technology. Spring, 2008.
- INFORMS Optimization Society Student Paper Prize. November, 2007.
- INFORMS Doctoral Colloquium, 2007.
- MIP Student Travel Award. 2006, 2007 and 2008.
- SMS 2006/NATO ASI travel scholarship. Summer 2006.
- John Morris Fellowship. Georgia Institute of Technology, 2004 – 2008.
- Graduated with Maximum Distinction. Universidad de Chile, December 23, 2003.
- Graduated with Distinction. Universidad de Chile, August 9, 2002.
- Distinguished Student. School of Engineering Sciences, Universidad de Chile, 1996–1997.
- Academic Excellency Scholarship. School of Engineering Sciences, Universidad de Chile, 1996.

Service, Affiliations and Other Professional Activities

- Chair of the INFORMS Section on Energy, Natural Resources, and the Environment (ENRE). December, 2010–November, 2012.
- Vice-Chair (Chair Elect) of the INFORMS Section on Energy, Natural Resources, and the Environment (ENRE). December, 2008–November, 2010.
- Committee member, Best Presentation in ENRE Sponsored Mining Sessions at the 2011 INFORMS annual meeting.
- Reviewer for Annals of Operations Research, Computers & Operations Research, Computational Optimization and Applications, Discrete Optimization, European Journal of Operational Research, INFORMS Journal on Computing, IPCO, Journal of Global Optimization, Journal of Optimization Theory and Applications, Mathematics of Operations Research, Mathematical Programming, Mathematical Programming Computation, Management Science, Operations Research, Operations Research Letters, Optimization Letters and SIAM Journal on Optimization.
- Reviewer for the 2010 and 2012 FONDECYT National Research Funding Competition of the Chilean National Commission for Scientific and Technological Research (CONICYT).

- Reviewer for the 2012 Small Grants Program of the University of Pittsburgh Central Research Development Fund.
- Session chair at 2010 INFORMS annual meeting.
- Member of program committee, 14th Symposium for Systems Analysis in Forest Resources (SSAFR 2010), Maitencillo, Chile, March 8–11, 2011.
- Member of program committee, 8th Mixed Integer Programming Workshop (MIP 2011), Waterloo, ON, June 20–23, 2011.
- Chair of program committee, 9th Mixed Integer Programming Workshop (MIP 2012), Davis, CA, July 16–19, 2012.
- Co-Chair ENRE sponsored cluster at ALIO-INFORMS Joint International Meeting, Buenos Aires, Argentina, June, 2010.
- Co-organizer of the Integer Programming and DOS Optimization Seminars of The H. Milton Stewart School of Industrial and Systems Engineering at the Georgia Institute of Technology (Spring, 2007–Spring 2009).
- Member of IIE (2010–Present), INFORMS (2005–Present), Mathematical Optimization Society (2006–Present) and SIAM (2006–Present).