



## Roger Z. Ríos, Ph.D.

Assistant Professor of Operations Research  
Academic Coordinator, Masters Program in Systems Engineering  
Graduate Program in Systems Engineering  
Department of Mechanical and Electrical Engineering  
Universidad Autónoma de Nuevo León (México)

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### COORDINATES

**Work:**

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AP 111 - F, Cd. Universitaria  
San Nicolás de los Garza, NL 66450  
México

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### RESEARCH INTERESTS

**General:** The mathematical modeling of optimization problems, application and theory of operations research techniques, and design, development, and analysis of efficient algorithms to solve such problems.

**Specific:** Optimization problems arising in the pipeline industry, machine scheduling problems from manufacturing environments, network design optimization, heuristic techniques for hard optimization problems, stochastic optimization, and industrial applications of combinatorial optimization.

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### EDUCATION

**Ph.D.**, Operations Research and Industrial Engineering, 1993 - 97  
University of Texas at Austin  
Austin, Texas, USA

- Dissertation: "*Optimization of the Flowshop Scheduling Problem with Setup Times*". This dissertation addresses the makespan minimization of flow shop scheduling problems with sequence-dependent setup times. The research includes the development of both approximate algorithms for practical solutions and exact algorithms based on branch-and-cut and branch-and-bound methods.
- Supervisor: Prof. Jonathan F. Bard.
- Committee: Prof. Paul Jensen, Prof. Leon Lasdon, Prof. David Morton, and Prof. Gang Yu.
- GPA: 4.0 / 4.0.

**M.S.E., Operations Research and Industrial Engineering, 1991 - 92**  
University of Texas at Austin

- GPA: 4.0 / 4.0.

**Licenciado (B.Sc.) in Mathematics, 1983 - 88**  
Universidad Autónoma de Nuevo León (UANL)  
San Nicolás de los Garza, NL, México

- Thesis: "*Solution of the Two-Dimensional Steady-State Heat Transfer Equation by the Finite Element Method*". This thesis studies both linear and quadratic finite element approximations to the heat transfer equation and its impact in real-world glass-forming processes in terms of solution quality and computational (CPU time and memory) requirements.
- Supervisors: Ing. Antonio López-Reyes and Prof. Alfredo Alanís-Durán.
- GPA: 96.0 / 100.0.

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## ACADEMIC APPOINTMENTS

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**Assistant Professor, June 1999 - present**  
UANL, Graduate Program in Systems Engineering, San Nicolás de los Garza, NL, México.

**Postdoctoral Research Associate, July 1997 - June 1999**  
Texas A&M U., Dept. of Industrial Engineering, College Station, Texas, USA.

**Graduate Research Assistant, August 1994 - July 1997**  
**Teaching Assistant, June 1994 - May 1997**  
**Assistant Instructor, June - August 1995**  
**Graduate Research Assistant, January 1992 - June 1994**  
U. of Texas, Graduate Program in Operations Research & Industrial Engineering, Austin, USA.

**Teaching Assistant, February 1986 - August 1987**  
UANL, Facultad de Ciencias Físico-Matemáticas (FCFM), San Nicolás de los Garza, México.

**Instructor, July - October 1985**  
Centro Galileo, Monterrey, México.

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## ADMINISTRATIVE APPOINTMENTS

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**Academic Coordinator of Masters Program in Systems Engineering, May 2002 - present**  
Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, NL, México.

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## VISITING APPOINTMENTS

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**Visiting Researcher, June - August 2004**  
U. of Colorado, Leeds School of Business, Boulder, Colorado, USA.

**Visiting Researcher, July 1997 - July 1999**  
U. of Houston, High Performance Computing Center and Dept. of Mathematics, Houston, Texas, USA.

## PROFESSIONAL APPOINTMENTS

**Assistant Researcher**, May - August 1991

Eicor Tecnología, San Nicolás de los Garza, México.

- Research on glass-batch composition optimization.
- Implementation of linear programming code for the optimization.

**Assistant Researcher**, July 1986 - September 1990

Vitro Tec, Monterrey, México.

- Research on glass-forming processes.
- Development of finite element-based algorithms for process simulation.
- Research on efficient solution techniques for sparse matrices.

## HONORS

### Undergraduate

- **1st Place on Mathematics Contest**, August 1983  
Granted by the Mexican Mathematical Society and the UANL to the winner of the state-wide contest for high school students in the state of Nuevo León, México.
- **Scholarship for undergraduate studies**, 1983 - 1987  
Granted by the Mexican Mathematical Society and the UANL.
- **Top ranked Mathematics major student**, 1984 - 1987  
UANL, Facultad de Ciencias Físico-Matemáticas.

### Graduate: Fellowships and Scholarships

- **Fellowship for M.S. studies**, 1991 - 92  
Granted by the Mexican National Council of Science and Technology (CONACYT).
- **Fellowship for Ph.D. studies**, 1993 - 95  
Granted by CONACYT.
- **University Continuing Fellowship**, 1993 - 94  
Highest university-wide honor award granted by UT-Austin to an outstanding continuing doctoral student.
- **E. D. Farmer Fellowship**, 1994 - 95  
Granted by the Institute of Latin American Studies at UT-Austin to an outstanding Mexican doctoral student.
- **E. D. Farmer Fellowship**, 1995 - 96  
Granted by the Institute of Latin American Studies at UT-Austin to an outstanding Mexican doctoral student.
- **Travel Grant**, October 1995  
Granted by the Mechanical Engineering Dept. at UT-Austin to attend the INFORMS National Meeting in New Orleans, USA.
- **Travel Grant**, January 1996  
Granted by the NSF and the U. of Arizona to attend the Stochastic Programming Tutorial in Tucson, USA.

- **E. D. Farmer Fellowship, 1996 - 97**  
Granted by the Institute of Latin American Studies at UT-Austin to an outstanding Mexican doctoral student.
- **David Bruton Fellowship, 1996 - 97**  
Granted by UT-Austin to an outstanding doctoral student.
- **Travel Grant, May 1997**  
Granted by the Graduate Engineering Council at UT-Austin to attend the INFORMS National Meeting in San Diego, USA.

#### Graduate: Honors and Research Awards

- **Omega Rho International Honor Society Inductee, since 1992**  
Inducted by the Operations Research Society of America (now INFORMS).
- **Best Graduate Student Paper Award, November 1995**  
1st Student Research Conference, U. of Texas, Austin, USA.
- **Best Graduate Student Paper Award, October 1996**  
2nd Student Research Conference, U. of Texas, Austin, USA.

#### Professional

- **Invited Cluster Chair, October 1998**  
"Energy", INFORMS National Meeting, Seattle, USA.
- **UANL Academic Corps Fellow, Level 2, January 1999 - February 2001**  
University-wide distinction granted by UANL to outstanding faculty members for teaching and research. Level 2 is the 3rd highest category (out of 4).
- **Invited Cluster Co-chair, May 2000**  
"Energy", INFORMS National Meeting, Salt Lake City, USA.
- **Host Researcher, July 2000 - June 2001, July 2001 - June 2002**  
CONACYT's "Cátedra Patrimonial de Excelencia" Program, hosting Dr. Vyacheslav Kalashnikov from Central Economics and Mathematics Institute, Moscow, Russia.
- **SNI Fellow, Level 1, July 2000 - June 2005**  
Highest award granted by the Mexican National System of Researchers (SNI) for scientific merit. Level 1 is the 3rd highest category (out of 4).
- **1999 UANL Research Award, Exact Sciences category, September 2000**  
Most prestigious university-wide award granted by UANL to the best research work.
- **Young Investigator Award, October 2000 - October 2003**  
Granted by CONACYT to fund a 3-year research project.
- **2000 Excellent Performance, February 2001**  
Evaluation granted by the FIME Doctoral Committee, UANL, for yearly scientific production and activities in the doctoral program.
- **UANL Teaching Fellow, Level 3, April 2001 - March 2002**  
University-wide distinction granted by UANL to outstanding faculty members for teaching performance.

- **UANL Teaching Fellow**, Level 3, April 2002 - March 2003  
University-wide distinction granted by UANL to outstanding faculty members for teaching performance.
- **ALIO Vice-President**, November 2002 - October 2004  
Elected by the Latin-American Association on Operations Research (ALIO).
- **UANL Teaching Fellow**, Level 5, April 2003 - March 2004  
University-wide distinction granted by UANL to outstanding faculty members for teaching performance.
- **Biographee**, 2003-2004  
Biographical profile listed in *Who's Who in Science and Engineering*.
- **UANL Teaching Fellow**, Level 5, April 2004 - March 2005  
University-wide distinction granted by UANL to outstanding faculty members for teaching performance.
- **AMC-FUMEC Young Investigator Award**, June - August 2004  
Award granted by the Mexican Academy of Sciences and Mexico-USA Science Foundation to pursue Summer research in an American institution. Only six awards were granted nation-wide.

#### **Professional: Evaluation/Reviewing Committees**

- **Evaluation Committee Member**, March 2001  
2000 UANL Research Award, Exact Sciences Area
- **Evaluation Committee Member**, March 2002  
2001 UANL Research Award, Engineering and Technology Area
- **Project Evaluation Committee Member**, 2002-2003  
UANL PAICyT, Applied Sciences Area
- **Member of CONACYT Registry of Certified Reviewers**, 2002-  
Nation-wide certification granted by the Mexican National System for Scientific and Technological Evaluation to evaluate research project proposals in the Engineering area.
- **Evaluation Committee Member**, March 2003  
2002 UANL Research Award, Engineering and Technology Area
- **External Evaluator**, April 2003  
2003 Faculty Ranking, Institutional Research Dept., Facultad Católica de Química e Ingeniería Fray Rogelio Bacon, Rosario, Argentina.
- **Project Evaluation Committee Member**, 2004-2005  
UANL PAICyT, Applied Sciences Area
- **Evaluation Committee Member**, March 2004  
2003 UANL Research Award, Engineering and Technology Area

#### **Professional: Conference Program Committees**

- **Program Committee Member**, January 2000  
7th INFORMS Computing Society Conference, Cancún, México.
- **Program Committee Member**, September 2000  
X Latin-American Conference on Operations Research and Systems (CLAIO), México City.

- **Program Committee Member, 2002**  
XI Latin-American Conference on Operations Research and Systems (CLAIO), Concepción, Chile.
- **Advisory Committee Member, 2002**  
Mexican International Conference on Artificial Intelligence (MICAI), Mérida, México.
- **Program Committee Member, 2004**  
Mexican International Conference on Artificial Intelligence (MICAI), México City, México.
- **Program Committee Member, 2004**  
XII Latin-American Conference on Operations Research and Systems (CLAIO), Havana, Cuba.
- **Program Committee Member, 2004**  
X Latin-American Summer School on Operations Research (ELAVIO), Montevideo, Uruguay.
- **Program Committee Member, 2004**  
Mexican International Conference on Computer Science (ENC), Colima, México.

## PUBLICATIONS

### Work in Progress

- [Latin-Ibero-American Conference on Operations Research \(CLAIO XI\): An International Conference of Current Theory and Practice](#)  
L. Pradenas, R. Z. Ríos-Mercado, J. Ferland, R. Scherer, P. Michelon, and N. Maculan (editors)  
Special issue of *Annals of Operations Research*. Kluwer, Boston (in preparation)
- [Un método de reducción eficiente para problemas de optimización de redes de transporte de gas natural](#)  
R. Z. Ríos Mercado, S. Wu, L. R. Scott, and E. A. Boyd  
March 2003 (submitted to *Ciencia UANL*)
- [Solving a natural gas cash-out bilevel program by a penalty function method](#)  
V. V. Kalashnikov and R. Z. Ríos-Mercado  
April 2003 (submitted to *Optimization and Engineering*)
- [Aproximando la función de consumo de combustible en compresores de gas natural](#)  
Y. Villalobos Morales and R. Z. Ríos Mercado  
May 2004 (submitted to *Ingenierías*)
- [Operations Research and Systems \(CLAIO XII\)](#)  
S. Allende, M. A. Osorio, J. Ruckmann, and R. Z. Ríos-Mercado (editors)  
Special issue of *Annals of Operations Research*. Kluwer, Boston (in preparation)
- [Preprocesamiento efectivo de un problema de minimización de combustible en sistemas de transporte de gas natural](#)  
Y. Villalobos Morales and R. Z. Ríos Mercado  
July 2004 (submitted to *Revista Ingeniería de Sistemas*)
- [Optimal design of gating systems by gradient search methods](#)  
C. E. Esparza, M. P. Guerrero-Mata, and R. Z. Ríos Mercado  
December 2004 (submitted to *Computational Materials Science*)

## Books

1. [Integer Programming and Combinatorial Optimization: Proceedings of the 6th International IPCO Conference](#)  
R. E. Bixby, E. A. Boyd, and R. Z. Ríos-Mercado (editors)  
Lecture Notes in Computer Science, Vol. 1412, ISBN: 3-540-64590-X. Springer-Verlag, Berlin, 1998
2. [Operations Research and Systems \(CLAIO 2000\). Part I: Probability and Mathematical Programming](#)  
R. Z. Ríos-Mercado, M. A. Osorio-Lama, L. B. Morales, and F. Maldonado (editors)  
Special issue of *Annals of Operations Research*, Vol. 116, ISSN: 0254-5330. Kluwer, Boston, 2002.
3. [Operations Research and Systems \(CLAIO 2000\). Part II: Algorithms, Heuristics, and Energy Markets](#)  
R. Z. Ríos-Mercado, M. A. Osorio-Lama, L. B. Morales, and F. Maldonado (editors)  
Special issue of *Annals of Operations Research*, Vol. 117, ISSN: 0254-5330. Kluwer, Boston, 2002.

## Book Chapters and Contributions

4. [Heuristics for minimum cost steady-state gas transmission networks](#)  
S. Kim, R. Z. Ríos-Mercado, and E. A. Boyd  
In M. Laguna and J. L. González-Velarde, editors, *Computing Tools for Modeling, Optimization and Simulation: Interfaces in Computer Science and Operations Research*, Chapter 11, pages 203-213. Kluwer, Boston, 2000
5. [Natural gas pipeline optimization](#)  
R. Z. Ríos-Mercado  
In P. M. Pardalos and M. G. C. Resende, editors, *Handbook of Applied Optimization*, Chapter 18.8.3, pages 813-825. Oxford University Press, New York, 2002
6. [Computational experience with a GRG method for minimizing fuel consumption on cyclic natural gas networks](#)  
H. J. Flores-Villarreal and R. Z. Ríos Mercado  
In N. E. Mastorakis, I. A. Stathopoulos, C. Manikopoulos, G. E. Antoniou, V. M. Mladenov, and I. F. Gonos (editors), *Computational Methods in Circuits and Systems Applications*, pages 90-94. WSEAS Press, Athens, Greece, 2003. ISBN: 960-8052-88-2.

## Journals

7. [Computational experience with a branch-and-cut algorithm for flowshop scheduling with setups](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*Computers & Operations Research*, 25(5):351-366, 1998
8. [Heuristics for the flow line problem with setup costs](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*European Journal of Operational Research*, 110(1):76-98, 1998
9. [An enhanced TSP-based heuristic for makespan minimization in a flow shop with setup times](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*Journal of Heuristics*, 5(1):57-74, 1999
10. [A branch-and-bound algorithm for permutation flow shops with sequence-dependent setup times](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*IIE Transactions*, 31(8):721-731, 1999
11. [Model relaxations for the fuel cost minimization of steady-state gas pipeline networks](#)  
S. Wu, R. Z. Ríos-Mercado, E. A. Boyd, and L. R. Scott  
*Mathematical and Computer Modelling*, 31(2-3):197-220, 2000

12. [A reduction technique for natural gas transmission network optimization problems](#)  
R. Z. Ríos-Mercado, S. Wu, L. R. Scott, and E. A. Boyd  
*Annals of Operations Research*, 117(1-4):217-234, 2002
13. [The flow shop scheduling polyhedron with setup times](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*Journal of Combinatorial Optimization*, 7(3):291-318, 2003
14. [A non-sequential dynamic programming approach for natural gas network optimization](#)  
C. Borraz-Sánchez and R. Z. Ríos-Mercado  
*WSEAS Transactions on Systems*, 3(4):1384-1389, 2004
15. [Discrete bilevel programming: Application to a natural gas cash-out problem](#)  
S. Dempe, V. V. Kalashnikov, and R. Z. Ríos-Mercado  
*European Journal of Operational Research* (forthcoming)
16. [Efficient operation of natural gas transmission systems: A network-based heuristic for cyclic structures](#)  
R. Z. Ríos-Mercado, S. Kim, and E. A. Boyd  
*Computers & Operations Research* (forthcoming)

#### Magazine Articles

17. [Investigación de operaciones en acción: Aplicación del TSP en problemas de manufactura y logística](#)  
J. L. González Velarde and R. Z. Ríos-Mercado  
*Ingenierías*, 2(4):18-23, 1999. In Spanish. Translation: "Operations research in action: Application of the TSP in manufacturing and logistics problems"
18. [Heurísticas para secuenciamiento de tareas en líneas de flujo](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*Ciencia UANL*, 3(4):420-427, 2000. In Spanish. Translation: "Heuristics for flow shop scheduling"
19. [Investigación de operaciones en acción: Heurísticas para la Solución del TSP](#)  
R. Z. Ríos Mercado and J. L. González Velarde  
*Ingenierías*, 3(9):15-20, 2000. In Spanish. Translation: "Operations research in action: Heuristics for the solution of the TSP"
20. [Secuenciando óptimamente líneas de flujo en sistemas de manufactura](#)  
R. Z. Ríos-Mercado and J. F. Bard  
*Ciencia UANL*, 4(1):48-54, 2001. In Spanish. Translation: "Optimal sequencing of flow shops in manufacturing systems"
21. [La optimización binivel: Estudio de un caso en la industria de gas natural](#)  
R. Z. Ríos Mercado and V. V. Kalashnikov  
*Ingenierías*, 6(20):47-52, 2003. In Spanish. Translation: "Bilevel programming: A case study from the natural gas industry"
22. [Minimización heurística del número de tareas tardías al secuenciar líneas de flujo](#)  
M. A. Salazar Aguilar and R. Z. Ríos Mercado  
*Ingenierías*, 7(23):52-57, 2004. In Spanish. Translation: "Heuristic minimization of the number of tardy jobs in flow shop scheduling"
23. [Aplicación de la programación lineal en el sector forestal](#)  
L. Vargas Suárez, I. Cano Robles, and R. Z. Ríos Mercado  
*Ingenierías*, 7(24):19-26, 2004. In Spanish. Translation: "Application of linear programming in the forestry sector"



24. [Comparando métodos heurísticos para secuenciar tareas en líneas de flujo](#)  
M. L. Valenzuela Luna and R. Z. Ríos-Mercado  
*Ingenierías*, 7(25):35-39, 2004. In Spanish. Translation: "Comparison of heuristics for flow shop scheduling"

#### Conference Proceedings

25. [New heuristics for the flow line problem with setup costs](#)  
R. Z. Ríos-Mercado and J. F. Bard  
In *Proceedings of the 1st University of Texas Student Research Conference*, pages 173-185. U. of Texas, Austin, November 1995
26. [On solving the flow line scheduling problem with setup costs](#)  
R. Z. Ríos-Mercado and J. F. Bard  
In *Proceedings of the 2nd University of Texas Student Research Conference*, pages 93-103. U. of Texas, Austin, October 1996
27. [Compressor driven network flows](#)  
E. A. Boyd and R. Z. Ríos-Mercado  
In *Proceedings of the 1998 NSF Design and Manufacturing Grantees Conference*, pages 191-192. NSF, Arlington, Virginia, December 1997
28. [Towards the simplification of natural gas transmission networks](#)  
S. Wu, L. R. Scott, E. A. Boyd, and R. Z. Ríos-Mercado  
In *Proceedings of the 1999 NSF Design and Manufacturing Grantees Conference*. Long Beach, January 1999
29. [A heuristic for minimum cost steady-state gas transmission networks](#)  
S. Kim, R. Z. Ríos-Mercado, and E. A. Boyd  
In *Proceedings of the 25th International Conference on Computers & Industrial Engineering*, pages 407-410. New Orleans, March 1999
30. [Minimizing fuel usage on gas pipelines: A network based algorithm for looped topologies](#)  
S. Kim, R. Z. Ríos-Mercado, and E. A. Boyd  
In *Proceedings of the 2000 NSF Design and Manufacturing Research Conference*. Vancouver, Canada, January 2000.
31. [A network reduction technique for natural gas pipeline networks](#)  
S. Wu, L. R. Scott, R. Z. Ríos-Mercado, and E. A. Boyd  
In *Proceedings of the 10th Latin-American Conference on Operations Research and Systems*. México City, September 2000
32. [Minimizing cash-out penalty costs: A bilevel programming model](#)  
R. Z. Ríos Mercado, N. Secomandi, and V. Buraparate  
In *Proceedings of the 2001 NSF Design, Service and Manufacturing Grantees Research Conference*. Tampa, January 2001
33. [A penalty-function approach to a mixed-integer bilevel programming problem](#)  
V. V. Kalashnikov and R. Z. Ríos-Mercado  
In C. Zozaya, M. Mejía, P. Noriega, and A. Sánchez (editors), *Proceedings of the 3rd International Meeting on Computer Science (ENC'01)*, Vol. II, pages 1045-1054. Aguascalientes, México, September 2001

34. [Optimizing fuel consumption on gas transmission networks: Evaluation of a heuristic for cyclic systems](#)  
R. Z. Ríos-Mercado, S. Kim, and E. A. Boyd  
In *Proceedings of the 2001 IEEE International Conference on Systems, Man, and Cybernetics*, pages 3118-3122. Tucson, October 2001
35. [Approximating the fuel consumption function on natural gas centrifugal compressors](#)  
Y. Villalobos-Morales and R. Z. Ríos-Mercado  
In *Proceedings of the 2002 NSF Design, Service and Manufacturing Grantees Research Conference*. San Juan, Puerto Rico, January 2002
36. [An algorithm to solve a gas cash-out problem](#)  
V. V. Kalashnikov and R. Z. Ríos-Mercado  
In *Proceedings of the International Applied Business Research Conference*, paper 170, pages 1-9. Puerto Vallarta, Mexico, March 2002
37. [A MINLP model for minimizing fuel consumption on natural gas pipeline networks](#)  
D. Cobos-Zaleta and R. Z. Ríos-Mercado  
In *Proceedings of the XI Latin Ibero-American Conference on Operations Research*, paper A48-01, pages 1-9. Concepción, Chile, October 2002
38. [On NLP and MINLP formulations and preprocessing for fuel cost minimization of natural gas transmission networks](#)  
Y. Villalobos-Morales, D. Cobos-Zaleta, H. J. Flores-Villarreal, C. Borraz-Sánchez, and R. Z. Ríos-Mercado  
In *Proceedings of the 2003 NSF Design, Service and Manufacturing Grantees and Research Conference*. Birmingham, January 2003
39. [Efficient operation of natural gas pipeline networks: Computational finding of high quality solutions](#)  
H. J. Flores-Villarreal and R. Z. Ríos Mercado  
In *Proceedings of the International Applied Business Research Conference*, paper 352, pages 1-7. Acapulco, México, March 2003
40. [Evaluando la calidad de técnicas de optimización para un problema de diseño de sistemas de alimentación por gravedad](#)  
C. E. Esparza-Garcés, R. Z. Ríos-Mercado, and M. P. Guerrero-Mata  
In *Proceedings of the 11th International Technical Panel of Aluminum Processing and Exposition*. Cancún, México, July 2003
41. [Optimización del diseño de un sistema de alimentación en el proceso de producción de piezas automotrices](#)  
C. E. Esparza-Garcés, R. Z. Ríos-Mercado, and M. P. Guerrero-Mata  
In *Proceedings of the 15th International Congress and Exposition of the Foundry Industry*, paper 08, p. 128-139. Monterrey, México, October 2003
42. [A procedure for finding initial feasible solutions on cyclic natural gas networks](#)  
C. Borraz-Sánchez and R. Z. Ríos-Mercado  
In *Proceedings of the 2004 NSF Design, Service and Manufacturing Grantees and Research Conference*. Dallas, January 2004
43. [A tabu search approach for minimizing fuel consumption on cyclic natural gas pipeline systems](#)  
C. Borraz-Sánchez and R. Z. Ríos-Mercado  
In *Proceedings of the XII Latin-Ibero-American Conference on Operations Research and Systems*, paper T062. Havana, Cuba, October 2004

## Thesis

44. [\*Solución de la Ecuación de Transferencia de Calor Bidimensional en Estado Estable por el Método de Elementos Finitos\*](#)  
**R. Z. Ríos Mercado**  
Licenciatura (BSc) Thesis, UANL, San Nicolás de los Garza, México, March 1988. In Spanish.  
Translation: "Solution of the Two-Dimensional Heat Transfer Equation on Steady State by the Finite Element Method"
45. [\*Optimization of the Flowshop Scheduling Problem with Setup Times\*](#)  
**R. Z. Ríos Mercado**  
Ph.D. Dissertation, U. of Texas, Austin, August 1997

## Technical Reports

46. [\*New heuristics for the flow line problem with setup costs\*](#)  
**R. Z. Ríos-Mercado and J. F. Bard**  
Technical Report ORP96-01, Graduate Program in Operations Research & Industrial Engineering, U. of Texas, Austin, February 1996
47. [\*The flowshop scheduling polyhedron with setup times\*](#)  
**R. Z. Ríos-Mercado and J. F. Bard**  
Technical Report ORP96-07, Graduate Program in Operations Research & Industrial Engineering, U. of Texas, Austin, July 1996
48. [\*Computational experience with a branch-and-cut algorithm for flowshop scheduling with setups\*](#)  
**R. Z. Ríos-Mercado and J. F. Bard**  
Technical Report ORP97-01, Graduate Program in Operations Research & Industrial Engineering, U. of Texas, Austin, May 1997.
49. [\*A branch-and-bound algorithm for flowshop scheduling with setup times\*](#)  
**R. Z. Ríos-Mercado and J. F. Bard**  
Technical Report ORP97-02, Graduate Program in Operations Research & Industrial Engineering, U. of Texas, Austin, May 1997
50. [\*An enhanced TSP-based heuristic for makespan minimization in a flow shop with setup times\*](#)  
**R. Z. Ríos-Mercado and J. F. Bard**  
Technical Report ORP97-08, Graduate Program in Operations Research & Industrial Engineering, U. of Texas, Austin, December 1997
51. [\*Model relaxations for the fuel cost minimization of steady-state gas pipeline networks\*](#)  
**S. Wu, R. Z. Ríos-Mercado, E. A. Boyd, and L. R. Scott**  
Technical Report TR-99-01, Department of Computer Science, U. of Chicago, Chicago, January 1999
52. [\*Preprocessing on natural gas transmission networks\*](#)  
**R. Z. Ríos-Mercado, S. Wu, L. R. Scott, and E. A. Boyd**  
Technical Report PISIS-2000-01, Graduate Program in Systems Engineering, UANL, San Nicolás de los Garza, México, November 2000
53. [\*Preprocesamiento efectivo de un problema de minimización de combustible en sistemas de transporte de gas natural\*](#)  
**Y. Villalobos Morales and R. Z. Ríos Mercado**  
Technical Report PISIS-2002-01, Graduate Program in Systems Engineering, UANL, San Nicolás de los Garza, México, November 2002

54. [Solving a natural gas cash-out bilevel program by a penalty function method](#)  
**V. V. Kalashnikov and R. Z. Ríos-Mercado**  
 Technical Report PISIS-2002-03, Graduate Program in Systems Engineering, UANL, San Nicolás de los Garza, México, November 2002
55. [Discrete bilevel programming: Application to a gas shipper's problem](#)  
**S. Dempe, V. V. Kalashnikov, and R. Z. Ríos-Mercado**  
 Working Paper 2002-02, Freiberg University of Mining and Technology, Freiberg, Germany, November 2002
56. [Efficient operation of natural gas transmission systems: A network-based heuristic for cyclic structures](#)  
**R. Z. Ríos-Mercado, S. Kim, and E. A. Boyd**  
 Technical Report PISIS-2003-03, Graduate Program in Systems Engineering, UANL, San Nicolás de los Garza, México, July 2003
57. [Optimal design of gating systems by gradient search methods](#)  
**C. E. Esparza, M. P. Guerrero-Mata, and R. Z. Ríos Mercado**  
 Technical Report PISIS-2004-06, Graduate Program in Systems Engineering, UANL, San Nicolás de los Garza, México, December 2004

#### Industrial Reports

58. [Solución de sistemas de ecuaciones lineales algebraicas de alto orden](#)  
**R. Z. Ríos Mercado**  
 Technical Report, Vitro Tec, Monterrey, México, April 1987. In Spanish. Translation: "Solution of symmetric large-scale systems of linear algebraic equations"
59. [M.E.F. bidimensional estable. Volumen I: Fundamentos](#)  
**R. Z. Ríos Mercado**  
 Technical Report, Vitro Tec, Monterrey, México, January 1989. In Spanish. Translation: "Finite element method two-dimensional steady state. Volume I: Foundations"
60. [M.E.F. bidimensional estable. Volumen II: Implementación](#)  
**R. Z. Ríos Mercado and G. Valenzuela Paz**  
 Technical Report, Vitro Tec, Monterrey, México, January 1989. In Spanish. Translation: "F.E.M. two-dimensional steady state. Volume II: Implementation"
61. [M.E.F. bidimensional inestable](#)  
**R. Z. Ríos Mercado**  
 Technical Report, Vitro Tec, Monterrey, México, June 1989. In Spanish. Translation: "F.E.M. two-dimensional time-dependent state"
62. [Simulador térmico 2-D: Proceso soplo-soplo, lado bombillo](#)  
**A. Ortega Morán, R. Z. Ríos Mercado, and M. S. Martínez Solís**  
 Technical Report, Vitro Tec, Monterrey, México, September 1990. In Spanish. Translation: "2-D Thermal simulator: Blow-blow process, blank mold stage"
63. [Simulador térmico 2-D: Proceso prensa-soplo, lado bombillo](#)  
**A. Ortega Morán, R. Z. Ríos Mercado, and M. S. Martínez Solís**  
 Technical Report, Vitro Tec, Monterrey, México, September 1990. In Spanish. Translation: "2-D Thermal simulator: Press-blow process, blank mold stage"
64. [TERMO2D: Simulador térmico de propósitos generales](#)  
**A. Ortega Morán, R. Z. Ríos Mercado, and M. S. Martínez Solís**  
 Technical Report, Vitro Tec, Monterrey, México, September 1990. In Spanish. Translation: "TERMO2D: General purpose thermal simulator"

## Invited Talks, Seminars

1. [Interior point methods for linear programming](#)  
R. Z. Ríos Mercado  
Facultad de Ciencias Físico-Matemáticas, UANL, San Nicolás de los Garza, México, November 1992.
2. [Computational experience with an interior point method code](#)  
R. Z. Ríos Mercado  
Center for Manufacturing Systems, Monterrey Tech, Monterrey, México, March 1993.
3. [Machine scheduling: Applications of combinatorial optimization](#)  
R. Z. Ríos Mercado  
Facultad de Ciencias Físico-Matemáticas, UANL, San Nicolás de los Garza, México, April 1995.
4. [Applications of operations research in industry](#)  
R. Z. Ríos Mercado  
7th ITNL Conference on Industrial Engineering, Instituto Tecnológico de Nuevo Laredo, México, March 1997.
5. [On solving the flow line scheduling problem with setup costs](#)  
R. Z. Ríos Mercado  
Operations Research/Management Science Seminar Series, U. of Texas, Austin, March 1997.
6. [Network optimization in the gas industry](#)  
R. Z. Ríos Mercado  
Center for Manufacturing Systems, Monterrey Tech, Monterrey, México, August 1997.
7. [Computational complexity](#)  
R. Z. Ríos Mercado  
Scientific Summer for high school students, Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, México, July 1999.
8. [The importance of mathematics and computing in forming human resources at the graduate level](#)  
R. Z. Ríos Mercado  
Facultad de Ciencias Físico-Matemáticas, UANL, San Nicolás de los Garza, México, November 1999.
9. [Computational complexity: When an Optimization Problem is Easy or Hard to Solve](#)  
R. Z. Ríos Mercado  
PISIS Seminar Series, Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, México, August 2000.
10. [Optimal sequencing of flow shops in manufacturing systems](#)  
R. Z. Ríos Mercado  
Mathematics Department Seminar Series, Instituto Tecnológico Autónomo de México, México City, September 2000.
11. [Optimal sequencing of flow shops in manufacturing systems](#)  
R. Z. Ríos Mercado  
Facultad de Ciencias Físico-Matemáticas, UANL, San Nicolás de los Garza, México, September 2000.
12. [Optimal sequencing of flow shops in manufacturing systems](#)  
R. Z. Ríos Mercado  
Universidad del Norte, Monterrey, México, November 2000.

13. [Successful Graduates](#)  
**R. Z. Ríos Mercado**  
Panel, Facultad de Ciencias Físico-Matemáticas, UANL, San Nicolás de los Garza, México, November 2000.
14. [Optimal sequencing of flow shops in manufacturing systems](#)  
**R. Z. Ríos Mercado**  
11th ITNL Conference on Industrial Engineering, Instituto Tecnológico de Nuevo Laredo, México, March 2001.
15. [Heuristics for scheduling flow lines with setup times](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, México, April 2001.
16. [Heuristics for optimal sequencing of flow lines in manufacturing environments](#)  
**R. Z. Ríos Mercado**  
Center for Artificial Intelligence, Monterrey Tech, Monterrey, México, April 2001.
17. [Industrial applications of linear algebra: Sparse matrices](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, May 2001.
18. [Modeling decision-making problems through operations research](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, June 2001.
19. [Modeling decision-making problems through operations research](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, June 2001.
20. [Industrial applications of linear algebra: Sparse matrices](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, August 2001.
21. [Modeling decision-making problems through stochastic programming](#)  
**R. Z. Ríos Mercado**  
FIME, UANL, San Nicolás de los Garza, México, September 2001.
22. [Modeling decision-making problems through operations research](#)  
**R. Z. Ríos Mercado**  
Universidad Autónoma de Tamaulipas, Cd. Mante, México, October 2001.
23. [Industrial applications of linear algebra: Sparse matrices](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, November 2001.
24. [The stable marriage problem](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, February 2002.
25. [On marriage stability problems](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, February 2002.

26. [Solving decision-making problems under uncertainty by stochastic optimization](#)  
**R. Z. Ríos Mercado**  
12th ITNL Conference on Industrial Engineering, Instituto Tecnológico de Nuevo Laredo, México, April 2002.
27. [The stable marriage problem and its application to decision making](#)  
**R. Z. Ríos Mercado**  
FCFM, UANL, San Nicolás de los Garza, México, May 2002.
28. [Exploiting effectively the mathematical structure of a scheduling problem in manufacturing systems](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, Mexico, September 2002.
29. [Computational issues in decision-making problems](#)  
**R. Z. Ríos Mercado**  
10th ITS Symposium on Computer Systems, Instituto Tecnológico de Saltillo, México, October 2002.
30. [Industrial applications of linear algebra: Sparse matrices](#)  
**R. Z. Ríos Mercado**  
Universidad de Monterrey, San Pedro Garza García, NL, México, November 2002.
31. [Solving a transportation problem under uncertainty by stochastic optimization](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, 03 March 2003.
32. [The stable marriage problem and its application to decision making](#)  
**R. Z. Ríos Mercado**  
13th National School on Optimization and Numerical Analysis (ENOAN), Saltillo, México, March 2003.
33. [The key importance of math: The applied side of the force](#)  
**R. Z. Ríos Mercado**  
Universidad de Monterrey, San Pedro Garza García, NL, México, April 2003.
34. [Scientific support to decision-making problems](#)  
**R. Z. Ríos Mercado**  
1st FIME Conference on Engineering Applied Knowledge, Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, México, May 2003.
35. [Curiosities in the making of a researcher](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, July 2003.
36. [The stable marriage problem](#)  
**R. Z. Ríos Mercado**  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, August 2003.
37. [Scientific support to decision-making problems](#)  
**R. Z. Ríos Mercado**  
1st FIME Symposium on Operations Research and Systems (IO-FIME), Facultad de Ingeniería Mecánica y Eléctrica, UANL, San Nicolás de los Garza, NL, México, 01 October 2003.
38. [Optimal sequencing of flow shops in manufacturing systems](#)  
**R. Z. Ríos Mercado**  
Seminar Series, School of Engineering, UNAM, México DF, 02 October 2003.

39. [Modeling and solution of decision-making problems](#)  
R. Z. Ríos Mercado  
7th Symposium on Informatics, School of Accounting and Management, Universidad Autónoma del Estado de México, Toluca, México, 03 October 2003.
40. [Decision-making problems in manufacturing systems](#)  
R. Z. Ríos Mercado  
1st Graduate Research Colloquium, FIME, UANL, San Nicolás de los Garza, México, 09 October 2003.
41. [On marriage stability problems](#)  
R. Z. Ríos Mercado  
50th FCFM Anniversary Conference, UANL, Campus Mederos, Monterrey, México, 14 October 2003.
42. [Dynamic programming and its application to optimization problems](#)  
R. Z. Ríos Mercado  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, February 2004.
43. [Applying scatter search to a machine scheduling problem](#)  
R. Z. Ríos Mercado  
PISIS Seminar Series, FIME, UANL, San Nicolás de los Garza, México, August 2004.

#### Paper Presentations at Conferences

44. [A greedy randomized adaptive search procedure for the flowshop problem with sequence-dependent setup times](#)  
R. Z. Ríos-Mercado and J. F. Bard  
Invited paper, INFORMS National Meeting, New Orleans, October 1995.
45. [New heuristics for the flow line problem with setup costs](#)  
R. Z. Ríos-Mercado and J. F. Bard  
1st University of Texas Student Research Conference, U. of Texas, Austin, November 1995.
46. [On solving the flow line problem with setup costs](#)  
R. Z. Ríos-Mercado and J. F. Bard  
2nd University of Texas Student Research Conference, U. of Texas, Austin, October 1996.
47. [A branch-and-bound algorithm for flowshop scheduling with setups](#)  
R. Z. Ríos-Mercado and J. F. Bard  
INFORMS National Meeting, San Diego, May 1997.
48. [A hybrid heuristic for flowshop scheduling with setups](#)  
R. Z. Ríos-Mercado and J. F. Bard  
INFORMS National Meeting, Dallas, October 1997.
49. [Evaluating the quality of pipeline optimization algorithms](#)  
R. Z. Ríos-Mercado, E. A. Boyd, L. R. Scott, and S. Wu  
NSF Design and Manufacturing Grantees Conference, Monterrey, México, January 1998.
50. [Lower bounds for makespan minimization in a flow shop with setups](#)  
R. Z. Ríos-Mercado and J. F. Bard  
Invited paper, INFORMS National Meeting, Montreal, Canada, April 1998.
51. [Mathematical models for the marketing of natural gas pipeline networks](#)  
R. Z. Ríos-Mercado, R. Elizondo, and E. A. Boyd  
INFORMS National Meeting, Montreal, Canada, April 1998.



52. [Optimization of natural gas pipeline networks](#)  
R. Z. Ríos-Mercado, E. A. Boyd, L. R. Scott, and S. Wu  
SIAM Annual Meeting, Toronto, Canada, July 1998.
53. [Lower bounds for fuel cost minimization on gas transmission networks](#)  
R. Z. Ríos-Mercado  
INFORMS National Meeting, Seattle, October 1998.
54. [Evaluating model relaxations for least cost gas transmission networks](#)  
R. Z. Ríos-Mercado, S. Wu, E. A. Boyd, and L. R. Scott  
6th SIAM Conference on Optimization, Atlanta, May 1999.
55. [Heuristics for minimum cost steady-state gas transmission networks](#)  
R. Z. Ríos-Mercado, S. Kim, and E. A. Boyd  
Invited paper, 7th INFORMS Computing Society Conference, Cancún, México, January 2000.
56. [A network reduction technique for natural gas pipeline networks](#)  
R. Z. Ríos-Mercado, S. Wu, E. A. Boyd, and L. R. Scott  
10th Latin-American Conference on Operations Research and Systems. México City, September 2000.
57. [Natural gas pipeline optimization: The state of the art](#)  
R. Z. Ríos-Mercado  
INFORMS National Meeting, San Antonio, USA, November 2000.
58. [Optimizing fuel consumption on gas transmission networks: Evaluation of a heuristic for cyclic systems](#)  
R. Z. Ríos-Mercado, S. Kim, and E. A. Boyd  
IEEE International Conference on Systems, Man, and Cybernetics, Tucson, October 2001.
59. [A MINLP model for minimizing fuel consumption on natural gas pipeline networks](#)  
D. Cobos-Zaleta and R. Z. Ríos-Mercado  
11th Latin-Ibero-American Conference on Operations Research, Concepción, Chile, October 2002.
60. [Computational experience with a GRG method for minimizing fuel consumption on cyclic natural gas networks](#)  
H. J. Flores-Villarreal and R. Z. Ríos Mercado  
7th WSEAS International Conference on Systems. Corfu, Greece, July 2003.
61. [Natural gas transmission systems: An overview of optimization methods](#)  
R. Z. Ríos Mercado  
15th Annual POM Conference, Cancún, Mexico, May 2004.
62. [A Non-sequential Dynamic Programming Approach for Cyclic Natural Gas Pipeline Systems](#)  
C. Borraz-Sánchez and R. Z. Ríos Mercado  
CORS/INFORMS Joint International Meeting, Banff, Canada, May 2004.
63. [Optimization of cyclic natural gas transmission systems by tabu search: A computational experience](#)  
C. Borraz-Sánchez and R. Z. Ríos Mercado  
International Conference on Cybernetics and Information Technologies, Systems and Applications, Orlando, July 2004.
64. [A tabu search approach for minimizing fuel consumption on cyclic natural gas pipeline systems](#)  
C. Borraz-Sánchez and R. Z. Ríos Mercado  
XII Latin-Ibero-American Conference on Operations Research and Systems, Havana, Cuba, October 2004.

## STUDENT THESIS SUPERVISION

### In progress

- Humberto J. Flores (M.Sc.), Graduate Program in Systems Engineering, UANL, in progress.
- Francisco R. Almaguer (Ph.D.), "*Localización Robusta de Plantas y Almacenes en una Cadena de Suministro*," Graduate Program in Systems Engineering, UANL, in progress. (Co-chaired with Prof. José Luis González, Center for Integrated Manufacturing Systems, ITESM-Monterrey.)
- Leticia G. Vargas (M.Sc.), Graduate Program in Systems Engineering, UANL, in progress.

### Chaired: Ph.D.

- Carlos E. Esparza (2003), "*Optimización de un Sistema de Alimentación para el Llenado de Moldes con Aleaciones de Aluminio*." Graduate Program in Materials Engineering (DIMAT), UANL (co-chaired with Prof. Martha P. Guerrero, DIMAT, UANL.) In Spanish, translation: "Gating System Optimization for Mold Filling with Aluminum Alloys."

### Chaired: M.Sc.

- Yanet Villalobos (2002), "*Pre-procesamiento de un Problema de Optimización de Redes de Gas Natural*." M.Sc. in Systems Eng., Graduate Program in Systems Engineering, UANL. In Spanish, translation: "Pre-processing of a Natural Gas Network Optimization Problem."
- Diana Cobos (2003), "*Modelos de Optimización Entera Mixta No Lineal en Sistemas de Transporte de Gas Natural*." M.S. in Systems Eng., Graduate Program in Systems Engineering, UANL, 2003. In Spanish, translation: "Mixed-Integer Nonlinear Programming Models in Natural Gas Transportation Systems."
- Conrado Borraz (2004), "*Una Metodología de Solución basada en Programación Dinámica No Secuencial y Búsqueda Tabú para la Operación Eficiente de Sistemas de Transporte de Gas Natural en Estado Estable*." M.S. in Systems Eng., Graduate Program in Systems Engineering, UANL, 2004. In Spanish, translation: "A Solution Methodology based on Non-sequential Dynamic Programming and Tabu Search for the Efficient Operation of Steady-State Natural Gas Transportation Systems."

### Committee Member / External Advisor

- Suming Wu (Ph.D.), "*Steady-State Simulation and Fuel Cost Minimization of Gas Pipeline Networks*," Dept. of Mathematics, U. of Houston, 1998.
- Seongbae Kim (Ph.D.), "*Minimum-Cost Fuel Consumption on Natural Gas Transmission Network Problem*," Dept. of Industrial Engineering, Texas A&M U., 1999.
- Ma. Aracelia Alcorta (Ph.D.), "*Tratamiento Integral de Filtrado y Control Óptimo de Procesos No Lineales con Múltiples Retardos Variantes en el Tiempo*," Doctoral Program in Industrial Physics Engineering, FCFM, UANL, 2003. In Spanish, translation: "Filtering and Optimal Control of Nonlinear Processes with Multiple Time Delays."
- Karim de Alba (Ph.D.), "*Un Procedimiento Heurístico para un Problema de Diseño de Redes Multiproducto con Capacidad Finita y Cargos Fijos*," Graduate Program in Systems Engineering, UANL, 2004. In Spanish, translation: "A Heuristic Procedure for a Capacitated Fixed-Charge Multicommodity Network Design Problem."
- J. F. Augusto Medina (M.Sc.), Graduate Program in Systems Engineering, UANL, in progress.

## PROJECTS

### Grants as a PI

- **"Efficient Operation of Natural Gas Transmission Networks"** (1999 - 2000)  
Awarded by CONACYT, Installation Project Program, grant no. I32827-A, \$70,000 pesos (\$7,368 USD).
- **"Efficient Operation of Natural Gas Transmission Networks"** (2000 - 2001)  
Awarded by UANL, Scientific and Technological Research Support Program, grant no. CA363-00, \$50,000 pesos (\$5,263 USD).
- **"Intelligent Optimization of Natural Gas Transmission Networks"** (2000 - 2003)  
Awarded by CONACYT, Young Investigator Project Program, grant no. J33187-A, \$1,123,553 pesos (\$118,760 USD).
- **"Evaluating the Quality of Optimization Algorithms for Pipeline Networks"** (2001 - 2002)  
Awarded by UANL, Scientific and Technological Research Support Program, grant no. CA555-01, \$60,000 pesos (\$6,315 USD).
- **"Heuristic Methods for Pipeline Network Optimization"** (2002 - 2003)  
Awarded by UANL, Scientific and Technological Research Support Program, grant no. CA763-02, \$60,000 pesos (\$6,500 USD).
- **"Pipeline Network Optimization: Implementation of Heuristic Techniques"** (2004 - 2005)  
Awarded by UANL, Scientific and Technological Research Support Program, grant no. CA820-04, \$60,000 pesos (\$5,200 USD).
- **"Intelligent Optimization of Scheduling Problems in Manufacturing Systems"** (2004)  
Awarded by AMC-FUMEC, Young Investigator Program for Summer Research, \$4,500 USD.

### Other Awards/Funding

- **"Funding for PISIS-UANL Infrastructure"** (2002)  
Co-directors: Dr. Roger Z. Ríos, Dra. Ada Álvarez. Collaborators: Dr. Óscar Chacón, Dr. César Villarreal, Dr. Igor Litvinchev. Awarded by CONACYT under the PIFOP Program, for a new building for the Graduate Program in Systems Engineering at UANL, \$8'000,000 pesos (800,000 USD).
- **"Funding for PISIS-UANL Computer Lab"** (2002)  
Co-directors: Dr. Roger Z. Ríos, Dra. Ada Álvarez. Collaborators: Dr. Óscar Chacón, Dr. César Villarreal, Dr. Igor Litvinchev. Awarded by CONACYT under the PIFOP Program, for a new high performance computer lab for the Graduate Program in Systems Engineering at UANL, \$1'200,000 pesos (120,000 USD).
- **"Funding for PISIS-UANL Research Collaboration"** (2002)  
Co-directors: Dr. Roger Z. Ríos, Dra. Ada Álvarez. Collaborators: Dr. Óscar Chacón, Dr. César Villarreal, Dr. Igor Litvinchev. Awarded by CONACYT under the PIFOP Program, for supporting research collaboration between faculty from the Graduate Program in Systems Engineering at UANL and other institutions, \$600,000 pesos (60,000 USD).

### Participant in Other Projects

- **Research Associate** in **"Safe and Energy-Efficient Natural Gas Networks."** Co-PIs: Dr. E. Andrew Boyd (Texas A&M U.) and Dr. L. Ridgway Scott (U. of Houston). Sponsored by the Texas Higher Education Coordinating Board, ARP/ATP, grant no. 999903-122, 1997 - 98.
- **Research Associate** in **"Compressor-Driven Network Flows."** PI: Dr. E. Andrew Boyd (Texas A&M U.) Sponsored by the National Science Foundation, grant no. DMI-9622106, 1997 - 99.
- **Research Associate** in **"Solution of Bilevel Programming Problems by Penalty Function Techniques."** PI: Dr. Vyacheslav V. Kalashnikov (UANL). Sponsored by UANL-PAICYT, grant CA562-01, 2001 - 2002.
- **Research Associate** in **"Robust Capacitated Multicommodity Network Design"**. PI: Dra. Ada M. Álvarez (UANL). Sponsored by CONACYT (grant 36669-A) and UANL-PAICYT (grant CA807-02), 2002 - 2005.

## TEACHING

### Courses Taught: Undergraduate

- Engineering Economic Analysis (30 hrs./semester, U. of Texas - Austin, 4 times, 1995 - 97)
- Introduction to Operations Research (45 hrs./semester, U. of Texas - Austin, once, 1995)
- Operations Research (48 hrs./semester, UANL-FIME, once, 2004)

### Courses Taught: Graduate

- Linear Programming (48 hrs./semester, UANL-FIME, 3 times, 1999 - 2003)
- Foundations of Integer Programming (48 hrs./semester, UANL-FIME, once, 2000)
- Queueing Theory (45 hrs./semester, UANL-FCQ, once, 2000)
- Foundations of Stochastic Processes (48 hrs./semester, UANL-FIME, twice, 2000 - 2001)
- Queueing Systems (48 hrs./semester, UANL-FIME, once, 2001)
- Network Flow Programming (48 hrs./semester, UANL-FIME, twice, 2002 - 2003)
- Data Structures in C++ (48 hrs./semester, UANL-FIME, once, 2004)

## PROFESSIONAL SERVICE

### Editorships

- **Associate Editor**, Area: Operations Research, March 2003 - present  
*Journal of Applied Mathematics and Decision Science*

### Service to UANL

- **Co-founder** (with Ada Álvarez and Oscar L. Chacón) of Masters Program in Systems Engineering at Facultad de Ingeniería Mecánica y Eléctrica. Approved by H. Consejo Universitario in December 1999.
- **Host Professor**, 2 high school students supervised during the II Scientific Summer Program, July-August 2000.
- **Reviewer**, 2000 UANL Research Award, Exact Sciences category, March 2001
- **Host Professor**, 1 high school student supervised during the III Scientific Summer Program, July-August 2001.
- **Reviewer**, 2001 UANL Research Award, Engineering and Technology category, March 2002
- **Project Reviewer**, 2002 UANL PAICyT, Applied Sciences Area, April 2002
- **Host Professor**, 2 undergraduate students supervised during the IV Scientific Summer Program, July-August 2002.
- **Collaborator**, Symposium on Education, Science, and Technology, FIME, October 2002
- **Reviewer**, 2002 UANL Research Award, Engineering and Technology category, March 2003
- **Organizing Committee Member**, 1st FIME Symposium on Operations Research and Systems, October 2003
- **Project Reviewer**, 2004 UANL PAICyT, Applied Sciences Area, January 2004
- **Reviewer**, 2003 UANL Research Award, Engineering and Technology category, March 2004

### Service to Mexican Academy of Sciences

- **Host Professor**, 5 undergraduate students supervised during the XI Scientific Summer Program, June-August 2001.
- **Host Professor**, 1 undergraduate student supervised during the XII Scientific Summer Program, June-August 2002.
- **Host Professor**, 2 undergraduate students supervised during the XIII Scientific Summer Program, June-August 2003.

### Offices Held

- **U. of Texas Chapter President**, Omega Rho International Honor Society, 1993 - 97
- **Vice-President**, Latin-American Association on Operations Research (ALIO), 2002 -2004

### Journal Refereeing

- *Journal of Heuristics*, 2 papers, 1995 - 1999
- *Computers & Operations Research*, 6 papers, 1997 - 2002
- *International Journal of Operations and Quantitative Management*, 1 paper, 1998
- *Discrete Applied Mathematics*, 1 paper, 1998
- *IIE Transactions*, 1 paper, 1999 - 2001
- *Journal of Computational and Graphical Statistics*, 1 paper, 1999
- *European Journal of Operational Research*, 4 papers, 2001 - 2004
- *Ingenierías*, 2 papers, 2001 - 2002
- *Journal of Applied Mathematics & Decision Sciences*, 2 papers, 2003 - 2004

### Other Refereeing Work

- Referee, 1 paper, *Proceedings of the 7th INFORMS Computing Society Conference*, July 1999
- Reviewer, 1999 Student TECNOS Award (best BSc thesis), September 1999
- Referee, 2 papers, *Proceedings of the 9th Industrial Engineering Research Conference*, December 1999
- Reviewer, 5 papers, *X CLAIO*, June 2000
- Reviewer, 14 works, 2000 UANL Research Award, Exact Sciences category, March 2001
- Reviewer, 1 paper, *XXXII ITESM Conference*, October 2001
- Reviewer, 2 papers, *MICAI 2002*, December 2001
- Reviewer, 9 works, 2001 UANL Research Award, Engineering and Technology category, March 2002
- Reviewer, 41 projects, 2002 UANL PAICyT, Applied Sciences Area, April 2002
- Referee, 1 paper, *MIC 2001*, May and December 2002
- Reviewer, 1 paper, *XIII SNM Conference*, September 2002
- Reviewer, 14 works, 2002 UANL Research Award, Engineering and Technology category, March 2003
- Reviewer, 5 candidates, Faculty Ranking, Institutional Research Dept., Facultad Católica de Química e Ingeniería Fray Rogelio Bacon, Rosario, Argentina, June-September 2003
- Reviewer, 5 papers, *MICAI 2004*, November 2003
- Reviewer, 43 projects, 2004 UANL PAICyT, Applied Sciences Area, January 2004
- Reviewer, 9 works, 2003 UANL Research Award, Engineering and Technology category, March 2004
- Reviewer, 6 papers, Mexican International Conference on Computer Science, April 2004

### Conference Organization

- **Organizing Committee Member**, 6th International Conference on Integer Programming and Combinatorial Optimization (IPCO), Houston, June 1998
- **Cluster Chair**, "Energy", INFORMS National Meeting, Seattle, October 1998
- **Session Chair**, "Nonlinear Programming II", INFORMS National Meeting, Seattle, October 1998
- **Session Organizer and Chair**, "Applications of Operations Research in the Natural Gas Industry", 7th INFORMS Computing Society Conference, Cancún, México, January 2000
- **Cluster Co-chair**, "Energy", INFORMS National Meeting, Salt Lake City, May 2000
- **Session Organizer and Chair**, "Bilevel Programming", 10th CLAIO, México City, September 2000
- **Session Organizer and Chair**, "Branch-and-Cut Algorithms", INFORMS National Meeting, San Antonio, November 2000
- **Session Chair**, "Environment and Natural Resources I", INFORMS National Meeting, San Antonio, November 2000
- **Session Chair**, "Optimization and Mathematical Programming", IEEE International Conference on Systems, Man, and Cybernetics, Tucson, EUA, October 2001
- **Session Chair**, "Modeling Systems", 11th CLAIO, Concepción, Chile, October 2002
- **Session Chair**, "Simulation and Modeling", 7th WSEAS International Conference on Systems, Corfu, Greece, July 2003
- **Organizing Committee Member**, 1st FIME Symposium on Operations Research and Systems (IO-FIME), UANL, San Nicolás de los Garza, México, October 2003
- **Session Chair**, "Logistics Research and Models", 15th Annual POM Conference, Cancún, Mexico, May 2004
- **Session Chair**, "Energy Modeling", CORS/INFORMS Joint Int. Meeting, Banff, Canada, May 2004
- **Session Chair**, "Meta-Heuristics", 12th CLAIO, Havana, Cuba, October 2004

### Conferences Attended

- 17th Mexican Mathematical Society Annual Meeting, Guanajuato, México, 1983
- 31st Mexican Physics Society Annual Meeting, Monterrey, México, 1988
- 21st Mexican Mathematical Society Annual Meeting, Hermosillo, México, 1988
- INFORMS National Meeting, New Orleans, 1995
- 1st University of Texas Student Research Conference, Austin, 1995
- Stochastic Programming Tutorial, Tucson, 1996
- 2nd University of Texas Student Research Conference, Austin, 1996
- 7th International Conference on Industrial Engineering, Nuevo Laredo, México, 1997
- INFORMS National Meeting, San Diego, 1997
- 29th PSIG Meeting, Tucson, 1997
- INFORMS National Meeting, Dallas, 1997
- NSF Design & Manufacturing Grantees Conference, Monterrey, México, 1998
- INFORMS National Meeting, Montreal, Canada, 1998
- 6th International IPCO Conference, Houston, 1998
- SIAM Annual Meeting, Toronto, Canada, 1998
- INFORMS National Meeting, Seattle, 1998
- 30th PSIG Meeting, Denver, 1998
- 6th SIAM Conference on Optimization, Atlanta, 1999
- 7th INFORMS Computing Society Conference, Cancún, México, 2000
- 10th Latin-American Conference on Operations Research and Systems, México City, 2000
- 32nd PSIG Meeting, Savannah, 2000
- INFORMS National Meeting, San Antonio, 2000
- 11th International Conference on Industrial Engineering, Nuevo Laredo, México, 2001
- IEEE International Conference on Systems, Man, and Cybernetics, Tucson, 2001
- 12th International Conference on Industrial Engineering, Nuevo Laredo, México, 2002
- 10th International Symposium on Computer Systems, Saltillo, México, 2002
- 11th Latin-Ibero-American Conference on Operations Research, Concepción, Chile, 2002
- 13th National School on Optimization and Numerical Analysis, Saltillo, Mexico, 2003
- 1st FIME Conference on Engineering Applied Knowledge, UANL, San Nicolás de los Garza, México, 2003
- 7th WSEAS International Conference on Systems, Corfu, Greece, 2003
- 1st FIME Symposium on Operations Research and Systems, UANL, San Nicolás de los G., México, 2003
- 7th Symposium on Informatics, Facultad de Contaduría y Administración, UAEM, Toluca, México, 2003
- 1st Graduate Research Colloquium, FIME, UANL, San Nicolás de los Garza, México, 2003
- World-wide Logistics Meeting, Monterrey, México, 2004
- 15th Annual POM Conference, Cancún, Mexico, 2004
- CORS/INFORMS Joint International Meeting, Banff, Canada, 2004
- International Conference on Cybernetics and Information Technologies, Systems and Applications, Orlando, 2004
- 12th Latin-Ibero-American Conference on Operations Research and Systems, Havana, Cuba, 2004

### Memberships: Current

- Institute for Operations Research and Management Sciences (INFORMS), 1995 - present
- Omega Rho International Honor Society, 1992 - present
- Society for Industrial and Applied Mathematics (SIAM), 1993 - present
- SIAM Activity Group on Optimization, 1993 - present
- Mathematical Programming Society, 1994 - present
- INFORMS Computing Society, 1996 - present
- Pipeline Simulation Interest Group, 1997 - present
- International Society for Computational Engineering and Sciences, 1999 - present
- Mexican Institute for Operations Research and Systems, 2000 - present

### Memberships: Former

- American Mathematical Society, 1995 - 96
- IEEE, 2000 - 2001

- IEEE Systems, Man and Cybernetics Society, 2000 - 2001
- Mathematical Association of America, 1993 - 95
- Mexican Mathematical Society, 1983 - 1999
- Operations Research Society of America (ORSA), 1992 - 1995

#### Mailing List Administration

- **Founder and Owner**, January 2000 - present  
PISIS-L, PISIS Faculty and students
- **Founder and Owner**, June 2003 - present  
IOMEX-L, Operations research in Mexico
- **Owner**, June 2003 - present  
SCHED-L, Scheduling research

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## COURSE BACKGROUND

#### Relevant Coursework

- **Optimization:** Linear programming, network flow programming, integer programming, mixed-integer programming, nonlinear programming, dynamic programming, combinatorial optimization, large-scale system optimization, sequencing and scheduling
- **Probability:** Probability and statistics, simulation, stochastic processes, stochastic programming, mathematical statistics, analysis and design of experiments, quality control, time series analysis
- **Computer Science:** Probabilistic analysis of algorithms, parallel algorithms for matrix computations, data structures in C/C++

#### Workshops / Seminars

- **Statistical Quality Control**, August 1990  
SABA Statistical Consulting, Monterrey, México.
- **Stochastic Programming Tutorial**, January 1996  
2-day tutorial, U. of Arizona, Dept. of Systems and Industrial Engineering, Tucson.
- **Natural Gas 101**, July 1997  
3-day workshop, Energy Seminars, Inc., Houston.
- **Workshop: OR in the Deregulated Power Industry**, October 1997  
Instructor: Robert Entriken. INFORMS National Meeting, Dallas.
- **Research at UANL and CONACYT Support Programs**, March 2001  
Center for Support and Academic Service, UANL, Monterrey, México.
- **Workshop: COIN-OR: Software Tools for Optimization**, May 2004  
CORS/INFORMS Joint International Meeting, Banff, Canada. Instructors: Ted Ralphs, Matthew Saltzman, J. Fasano, Alan King, Lou Hafer, and Steven Henderson

#### Tutorials

- **Machine Scheduling**, October 1995  
Instructor: Michael Pinedo. INFORMS National Meeting, New Orleans.
- **Tabu Search**, October 1995  
Instructors: Fred Glover and Manuel Laguna. INFORMS National Meeting, New Orleans.
- **Global Optimization**, May 1997  
Instructor: Cris Floudas. INFORMS National Meeting, San Diego.
- **Large Scale Problem Reformulation**, October 1997  
Instructor: Hanif Sherali. INFORMS National Meeting, Dallas.
- **Heuristics for Hard Scheduling Problems**, October 1997  
Instructor: Jan K. Lenstra. INFORMS National Meeting, Dallas.
- **Computational Issues in Combinatorial Optimization**, October 1997  
Instructor: Bill Cook. INFORMS National Meeting, Dallas.
- **Lagrangean Relaxation, Extensions & Applications**, October 1997  
Instructor: Monique Guegnard. INFORMS National Meeting, Dallas.
- **An Introduction to Tabu Search**, April 1998  
Instructor: Michel Gendreau. INFORMS National Meeting, Montreal.

- **Branch and Cut and Price**, April 1998  
Instructor: George L. Nemhauser. INFORMS National Meeting, Montreal.
- **Lift and Project Methods for Mixed-Integer Programming**, April 1998  
Instructor: Sebastián Ceria. INFORMS National Meeting, Montreal.
- **Column Generation Methods**, April 1998  
Instructor: Jacques Desrosiers. INFORMS National Meeting, Montreal.
- **Approximation Algorithms via Linear Programming**, October 1998  
Instructor: David Shmoys. INFORMS National Meeting, Seattle.
- **An Industrial Perspective on Optimization**, May 1999  
Instructor: John T. Betts. 6th SIAM Conference on Optimization, Atlanta.
- **Advances in Formulation and Solution of Difficult Combinatorial Optimization Problems**, May 1999  
Instructor: Karla L. Hoffman. 6th SIAM Conference on Optimization, Atlanta.
- **Reusable Software Components for Heuristic Search: HotFrame**, January 2000  
Instructors: David L. Woodruff and Stefan Voss. 7th INFORMS Computing Society Conference, Cancún, México.
- **Computational Global Optimization: Algorithms and Applications**, January 2000  
Instructor: Janos D. Pinter. 7th INFORMS Computing Society Conference, Cancún, México.
- **Operational Research Approaches to Genome Mapping**, October 2002  
Instructor: Jacek Blazewicz. CLAIO XI, Concepción, Chile.
- **Transportation, Planning, Models, Achievements, and Challenges**, October 2002  
Instructor: Michael Florian. CLAIO XI, Concepción, Chile.
- **Scatter Search: Methodology and Applications**, October 2002  
Instructor: Manuel Laguna. CLAIO XI, Concepción, Chile.
- **Simulation-Based Optimization**, October 2002  
Instructor: Averill M. Law. CLAIO XI, Concepción, Chile.
- **Models and Algorithms for the Train Timetabling Problem**, October 2002  
Instructor: Paolo Toth. CLAIO XI, Concepción, Chile.
- **Column Generation in Integer Linear Programming and Applications**, October 2002  
Instructor: Nelson Maculan. CLAIO XI, Concepción, Chile.
- **Staff Scheduling at USPS Mail Processing & Distribution Centers**, March 2003  
4-hr short-course. Instructor: Jonathan F. Bard. PISIS, UANL, México.
- **Scatter Search: Methodology and Applications**, May 2003  
Instructor: Manuel Laguna. PISIS, UANL, México.
- **Optimization through Collaborative Transportation**, February 2004  
Instructor: Garland Chow. World Logistics Meeting, Monterrey, México.
- **Creating Competitive Advantage Using Operations Research**, May 2004  
Instructor: Thomas M. Cook. CORS/INFORMS Joint International Meeting, Banff, Canada.
- **The New World of International Trade**, May 2004  
Instructor: Ralph E. Gomory. CORS/INFORMS Joint International Meeting, Banff, Canada.
- **Stochastic Programming**, May 2004  
Instructor: François V. Louveaux. CORS/INFORMS Joint International Meeting, Banff, Canada.
- **Operational Research in Telecommunications**, May 2004  
Instructor: Brigitte Jaumard. CORS/INFORMS Joint International Meeting, Banff, Canada.
- **Online Optimization**, May 2004  
Instructor: Patrick Jaillet. CORS/INFORMS Joint International Meeting, Banff, Canada.
- **OR Challenges in Forestry Resource Problems**, October 2004  
Instructor: Andrés Weintraub. CLAIO XII, Havana, Cuba.
- **Level Packing in Two Dimensions**, October 2004  
Instructor: Silvano Martello. CLAIO XII, Havana, Cuba.



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## COMPUTER SKILLS

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**Programming Languages:** C++, C, FORTRAN, BASIC.

**Mainframes:** UNIX (and compatible), VAX/VMS, IBM/VM operating systems.

**Microcomputers:** PC (Windows 95, MS-Windows, MS-DOS), Macintosh.

**Optimization Software:** CPLEX, OSL, GRG2, GAMS, MINTO, MATLAB.

**Miscellaneous:** System administration of IBM RS/6000 and Sun workstations, mailing list administration, world-wide web page design and development.

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## PERSONAL INFORMATION

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**DOB:** April 1966  
**Birthplace:** Monterrey, México  
**Marital status:** Married (to Ofelia Rodríguez, August 1992)  
**Children:** One boy (Vandari Pavel, born March 1996);  
one girl (Aleida Shaní, born February 1999)  
**Languages:** Spanish (native) and English (100%)

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## REFERENCES

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Prof. Jonathan F. Bard (UT-Austin, [jbard@mail.utexas.edu](mailto:jbard@mail.utexas.edu))  
Dr. Andrew Boyd (PROS Revenue Management, [aboyd@prosrn.com](mailto:aboyd@prosrn.com))  
Prof. Patrick Jaillet (MIT, [jaillet@mit.edu](mailto:jaillet@mit.edu))  
Prof. Manuel Laguna (U. of Colorado, [manuel.laguna@colorado.edu](mailto:manuel.laguna@colorado.edu))  
Prof. Leon S. Lasdon (UT-Austin, [lasdon@mail.utexas.edu](mailto:lasdon@mail.utexas.edu))  
Prof. David Morton (UT-Austin, [morton@mail.utexas.edu](mailto:morton@mail.utexas.edu))  
Prof. Ridgway Scott (U. of Chicago, [ridg@cs.uchicago.edu](mailto:ridg@cs.uchicago.edu))  
Prof. Gang Yu (UT-Austin, [yu@uts.cc.utexas.edu](mailto:yu@uts.cc.utexas.edu))

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## NOTATION

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UANL: Universidad Autónoma de Nuevo León  
CONACYT: Consejo Nacional de Ciencia y Tecnología (Mexican National Council for Science and Technology)