

# Resume

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## Address:

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## Personal:

Brazilian, 58 years old, married.  
Born in Lages, Brazil, on September 6, 1944.

## Current Position:

Full Professor – Dept. of Mathematics, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

## Education:

1967: Electronics Engineer, Brazilian Air Force Institute of Technology (ITA), São José dos Campos, Brazil.

1973: DSc. in Systems Engineering and Computer Science, COPPE – Federal University of Rio de Janeiro, Brazil.

1976: Postdoctoral fellow, Department of Electrical Engineering and Computer Science, University of California, Berkeley, CA.

## Professional Experience:

Professor – Dept. of Mathematics, Federal University of Santa Catarina, Florianópolis, SC, Brazil, since 1995.

Professor, COPPE, Federal University of Rio de Janeiro, 1970-1994.

Visiting Professor, Department of Electrical Engineering and Computer Science, University of California, Berkeley, CA, 1985-1987.

Visiting Researcher, INRIA, Rocquencourt, France, 1992-1993.

Visiting Professor, Technical University of Delft, The Netherlands, 1993-1994.

**Honors and prizes:**

Member of the Brazilian Academy of Sciences since 1998.

Member of the Brazilian National Order of the Scientific Merit, degree Comendador, 2002.

Prize “Citation classics”, ISI, for the paper in Mathematics and Computer Science with highest number of citations in the decade or 1990, written by a Brazilian scientist.

**Journals, Professional Societies:**

Vice-president of the Brazilian Society for Applied and Computational Mathematics (SBMAC), 1996-1997.

Council member-at-large of the Mathematical Programming Society, elected for the period 1991-1994.

Member of the Tucker Prize committee, 1994.

Member of the Dantzig Prize committee, 1997.

Member of the editorial board of the SIAM Journal on Optimization, 1992-1998.

Member of Mathematical Programming Society, Society for Industrial and Applied Mathematics (SIAM), American Mathematical Society (AMS), Brazilian Society for Operational Research (SOBRAPO), Brazilian Society for Applied and Computational Mathematics (SBMAC).

Referee for Mathematical Programming, Algorithmica, Mathematics on Operations Research, SIAM Journal of Optimization, Journal of Optimization Theory and Applications.

**Courses Taught and Theses Supervision:**

Taught graduate level courses in convex analysis, nonlinear programming, linear programming, optimization in graphs, power systems optimization, linear and sampled-data control theory.

Supervised 14 doctoral and 23 MSc theses.

Presently advising one DSc.

**Current Research Topics:**

Linear, nonlinear and nonsmooth optimization, interior point methods.

**Languages:**

Portuguese, English, Spanish and French.

**Book:**

Interior-point algorithms for linear programming (in Portuguese), IMPA, Rio de Janeiro, Brazil, 1989.

**Plenary talks in large conferences:**

- Third SIAM Conference on Optimization: “Path-following methods for linear and quadratic programming”, Boston, April 1989.
- 14th International Symposium on Mathematical Programming: “Mathematical foundations and strategies in Interior Point Algorithms for linear programming”, Amsterdam, August 1991.
- 16th IFIP Conference on System Modeling and Optimization: “Recent advances on interior point algorithms.” Compiègne, France, July 1993.
- 15th International Symposium on Mathematical Programming: “Interior point methods for linear programming and linear complementarity: state of the art,” Ann Arbor, USA, August 1994.

**Main Publications**

- (with E. Polak), “On constraint dropping schemes and optimality functions for a class of outer approximation algorithms,” *SIAM Journal of Control and Optimization*, vol. 17, no. 4, July 1979.
- (with E. Polak and R. Trahan), “An improved algorithm for optimization problems with functional inequality constraints,” *IEEE Trans. on Automatic Control*, vol. AC-25, no. 1, February 1980.
- “Conical projection algorithms for linear programming,” *Mathematical Programming* 43 (1989) 151:173.
- “An algorithm for solving linear programming problems in  $O(n^3L)$  operations,” in N. Megiddo (ed.), *Advances in mathematical programming – Interior point and related methods*, Springer-Verlag, New York, 1989.
- “Search directions for interior linear programming methods,” *Algorithmica* 6 (1991) 153:181.
- “Polynomial affine algorithms for linear programming,” *Mathematical Programming* 49 (1990) 7:21.
- “A polynomial affine algorithm for linear programming,” *Journal of the Brazilian Society of Operational Research* Rio de Janeiro, August 1988 (in Portuguese).
- “Interior point algorithms for linear programming problems with inequality constraints,” *Mathematical Programming* 52 (1991).
- (With M. Todd) “An  $O(\sqrt{n}L)$ -iteration large-step primal-dual affine algorithm for linear programming”, *SIAM Journal on Optimization*, 2 (1992) 349-359.
- “Large step path following algorithms for linear programming, part I: barrier function method”, *SIAM Journal on Optimization* 2 (1991).
- “Large step path following algorithms for linear programming, part II: potential reduction method”, *SIAM Journal on Optimization* 2 (1991).

- “On lower bound updates in primal potential reduction methods for linear programming”, *Mathematical Programming* 52 (1991).
- “Path following methods for linear programming”, *SIAM Review* 34 No. 2 (1992) 167-224. .
- “An Interior Trust Region Method for Linearly Constrained Optimization”, *COAL Newsletter* 19 (1991).
- (With R. Tapia) “On the convergence of the Mizuno-Todd-Ye algorithm to the analytic center of the solution set”, *SIAM Journal on Optimization* 7 (1997) 47–65.
- (With R. Tapia) “On the quadratic convergence of the simplified Mizuno-Todd-Ye algorithm for linear programming”, *SIAM Journal on Optimization* 7 (1997) 66–85.
- (With Frédéric Bonnans) “Convergence of interior point algorithms for monotone linear complementarity problems”, *Mathematics of Operations Research* 21 No. 1 (1996) 1-25.
- “The largest step path following algorithm for monotone linear complementarity problems,” *Mathematical Programming* 76 (1997) 309–332.
- (With Frédéric Bonnans) “Fast convergence of the simplified largest step path following algorithm,” *Mathematical Programming* 76 (1997) 95–116.
- “On the complexity of Linear Programming”, *Resenhas – IME-USP Journal, special issue dedicated to Paul Erdos*, Vol. 2, No. 2, (1995) 197–207.
- (With B. Fejoo e A. Sanchez) “Maintaining closeness to the analytic center of a polytope by perturbing added hyperplanes”, *Applied Mathematics and Optimization* 35 (1997) 139–144.
- (With Hugo J. Lara) “A note on properties of condition numbers”, *Linear Algebra and Its Applications* 261 (1997) 269–273.
- “Complexity of predictor-corrector algorithms for LCP based on a large neighborhood of the central path”, *SIAM J. on Optimization*, Vol. 10, No. 1, (1999) 183-194.
- “Two facts on the convergence of the Cauchy algorithm”, *Journal on Optimization Theory and Applications*, Vol. 107, No. 3 (2000), 593–602.
- (With Fernanda Raupp) “A Center Cutting Plane Algorithm for a Likelihood Estimate Problem,” *Computational Optimization and Applications*, 21, (2002) 277–300.
- (With Marli Cardia) “Properties of the central points in linear programming problems”, *Numerical Algorithms*, to appear.
- (With Rómulo Castillo) “A nonlinear programming algorithm based on non-coercive penalty functions”, *Mathematical Programming*, to appear.

### Technical reports

- (With Jean-Charles Gilbert and Elizabeth Karas) “Examples of ill-behaved central paths in convex optimization”, Federal University of Santa Catarina, April, 2001.
- (With Elizabeth Karas and Márcia Vanti) “A globally convergent filter method for nonlinear programming”, Federal University of Santa Catarina, October 2001.
- (With Marli Cardia) “Using the central path for computing the analytic center of a polytope”, Federal University of Santa Catarina, September, 2002.

- “A Simple Presentation of Karmarkar’s Algorithm”, Federal University of Santa Catarina, September 2002.
- (with L. Carlos) “A Primal Affine Scaling Algorithm for Linearly Constrained Convex Programs”, Federal University of Santa Catarina, September 2002.

### Participation in Recent International Events

- Fifteenth Conference on the Mathematics of Operations Research, Invited presentation “An overview of  $O(\sqrt{nL})$ -iteration algorithms for linear programming”, Dalfsen, Holland, January 1990.
- International Symposium on Interior Point Methods for Linear Programming, “A large-step potential reduction algorithm for linear programming”, Scheveningen, Holland, January 1990.
- 2nd. Asilomar Workshop on Progress in Mathematical Programming, “Path-following methods for linear programming”, Asilomar, USA, February 1990.
- TMS/ORSA Joint National Meeting, invited paper “A large-step path following potential reduction algorithm for linear programming”, Las Vegas, USA, May 1990.
- 1990 SIAM Annual Meeting, invited minisymposium “Large steps potential reduction algorithms for linear programming”, Chicago, July 1990.
- An Optimization Day in Iowa, talk “An interior point method for the introduction of a new constraint in a relaxed linear programming problem”, University of Iowa, Iowa City, August 1990.
- V Latin-Iberian-American Conference on Operations Research and Systems Engineering, conference: “Path following algorithms for linear programming,” Buenos Aires, Argentina, September 1990.
- TMS XXX – SOBRAPO XXIII Joint International Meeting: “On the convergence of the large step affine-scaling algorithm for linear programming”, Rio de Janeiro, July 1991.
- TMS XXX – SOBRAPO XXIII Joint International Meeting (with C. Martinhon): “A unified analysis of affine and projective primal potential reduction algorithms for linear programming”, Rio de Janeiro, July 1991.
- APDIO (Portuguese Operations Research Society) Workshop on Large-Scale Optimization: “An interior trust region method for linearly constrained nonlinear programming”, Coimbra, Portugal, July 1991.
- 2nd. Stockholm Optimization Days: “An interior trust region method for linearly constrained nonlinear programming”, Stockholm, August 1991.
- 6th IIMAS-UNAM Workshop on Numerical Analysis and Optimization: (With Jean-Louis Goffin) “Convergence of a Convex Programming Algorithm Based on Analytic Centers”, Oaxaca, Mexico, January 1992.
- I Congreso Iberoamericano de Estadística e Investigación Operativa: Plenary talk, “Convergence of primal-dual interior point algorithms for linear programming”, Cáceres, Spain, September 1992.
- Interior point methods workshop: “Logarithmic barrier methods for linear programming.” Budapest, Hungary, January 1993.

- INRIA Workshop on Interior Point Methods: “On the convergence of Mizuno-Todd-Ye algorithm,” Rocquencourt, France, February 1993.
- 2nd Gauss Symposium: Invited conference “Primal-Dual Interior Point Algorithms,” Munich, Germany, August 1993.
- NATO advanced study institutes, Algorithms for continuous optimization: “Convergence of interior point algorithms for linear complementarity problems,” Il Ciocco, Italy, September 1993.
- Workshop on Optimization in Theory and Practice: “Fast convergence of the largest step path following algorithm”, The University of Iowa, USA, August 1994.
- 15th International Symposium on Mathematical Programming: Plenary conference “Interior point methods for linear programming and linear complementarity: state of the art,” Ann Arbor, USA, August 1994.
- 15th International Symposium on Mathematical Programming: “Convergence of the largest step path following algorithm,” Ann Arbor, USA, August 1994.
- 6nd. Stockholm Optimization Days: “An interior trust region method for linearly constrained nonlinear programming”, Stockholm, June 1995.
- AMS-SIAM Seminar on Mathematics of Numerical Analysis: “Complexity of predictor-corrector interior point algorithms based on large neighborhoods of the central path”, Park City, Utah, July 1995.
- ICIAM-95: “Large steps path following algorithms for linear programming and linear complementarity problems”, Hamburg, Germany, July 1995.
- Seventh Stockholm Optimization Days: “Asymptotic properties of algorithms based on generalized penalty functions”, Stockholm, June 1996.
- Conference on Numerical Mathematics: “Asymptotic properties of algorithms based on generalized penalty functions”, Cambridge, England, June 1996.
- Conference on Foundations of Computational Mathematics: “A note on properties of condition numbers”, Rio de Janeiro, January 1997.
- IV International Conference on Approximation and Optimization in the Caribbean: Tutorial session on Interior Point Methods and two joint papers, March 1997.
- 16th International Symposium on Mathematical Programming: Dantzig Prize committee, Lausanne, agosto de 1997.
- L’Optimisation En Perspective: “Algorithmes de lagrangiens augment’es”, INRIA-Rocquencourt, France, September 1997.
- Fifth International Conference on Parametric Optimization and Related Topics, “Augmented Lagrangian methods based on generalized penalties”, Tokyo, October 1997.
- Optimization 98: Plenary talk “Augmented Lagrangean methods based on shifted generalized penalties”, Coimbra, Portugal, July 1998.
- FoCM semester at MSRI: participation for two months in the semester dedicated to Foundations of Computational Mathematics at MSRI, Berkeley, August to October 1998, and presentation of a talk in the Workshop on Continuous Optimization.

- MSRI-Evans Conference: conference entitled “Polynomial Interior Point Optimization Algorithms”, University of California at Berkeley, October 1998.
- 5th. International Conference on Approximation and Optimization in the Caribbean: Plenary talk “Augmented Lagrangian methods using generalized penalties”, Guadeloupe, March 1999.
- 1999 SIAM Conference on Optimization, 4 works (one individual and three with co-authors), Atlanta, May 1999.
- Deuxième Conférence Internationale en Recherche Opérationnelle: Plenary talk “The central concepts and mechanisms in interior point methods”, Marrakech, May 1999.
- International Conference on Foundations of Computational Mathematics in honor of Prof. Steve Smale’s 70th Birthday, “Examples of convex optimization problems with exotic behavior,” Hong Kong, July 2000.
- Workshop on high performance algorithms and software for nonlinear optimization, “Augmented Lagrangean algorithms with complementarity gap penalization” Erice, Italy, June 2001.
- Workshop Numerical Methods for Nonlinear Problems in Optimization and Control “Using the central path to generate cuts in convex programming”. Cortona, Italy, June 2001.
- 2002 SIAM Conference on Optimization, “A globally convergent filter method for nonlinear programming”, Toronto, May 2002.
- Troisième Conférence Internationale en Recherche Opérationnelle: Plenary talk: “Filter methods for nonlinear programming”, Marrakech, June 2002.
- IV Brazilian Workshop on Continuous Optimization: Plenary talk “Filter methods for nonlinear programming”, Rio de Janeiro, July 2002.

### **Doctoral Theses**

These dissertations are all in Portuguese, presented at the Graduate Schools of Engineering of the Federal University of Rio de Janeiro and the Federal University of Santa Catarina.

### **Federal University of Rio de Janeiro**

1. Ronaldo Cesar Marinho Persiano, “Operação ótima de sistemas de geração hidro-térmica,” 1976.
2. Antônio A. Fernandes de Oliveira, “Recobrimento contínuo ótimo,” 1979.
3. Sérgio Henrique Ferreira da Cunha, “Confiabilidade no planejamento do sistema elétrico,” 1984.
4. Angel Ramon Sanchez Delgado, “Utilização de algoritmos de pontos interiores na metodologia de planos cortantes,” 1991.
5. Daniel Segundo Cazalis, “Programação linear aplicada a sistemas de informação,” 1992.
6. Pedro di Novella, “Um algoritmo de pontos interiores para problemas de programação não linear com variáveis canalizadas,” 1994.
7. Ricardo Duarte Arantes, “Metodologias simbólicas para a resolução eficiente de sistemas lineares esparsos com estrutura estática,” 1996.

8. Rómulo A. Castillo, “Métodos de lagrangeano aumentado usando penalidades generalizadas para programação não linear”, 1998
9. Hugo Lara, “Números de condicionamento e propriedades limites da direção afim-escala em programação linear”, 1998.
10. Marli Cardia, “Usando a trajetória central para calcular o centro analítico de um polítopo após a adição de um plano de corte profundo”, 1998.
11. Fernanda Maria Raupp, “Cálculo de estimadores de máxima verossimilhança para o modelo misto baseado em métodos de planos de corte ”, 1998.
12. Marco Antônio F. Menezes, “Um algoritmo de ponto-interior-inviável com complexidade  $O(\sqrt{n}L)$  iterações para programação linear”, 1998.

**Federal University of Santa Catarina**

13. Luiz Carlos Matioli, “Uma nova família de funções de penalidade para algoritmos de lagrangeanos aumentados”, 2001.
14. Elizabeth Karas, “Exemplos de trajetória central mal comportada em otimização convexa e um algoritmo de filtros para programação não linear”, 2002.