Curriculum Vitae

Name	:	Roberto COMINETTI C-C.
Born	:	October 15th, 1961, Santiago, Chile
Citizenship	:	Chilean
Address	:	Departamento de Ingeniería Industrial Universidad de Chile República 701, Santiago, Chile Tel: (56 2) 9784033 email: `rccc@dii.uchile.cl`
Research interests	:	Optimization, convex analysis, path-following and penalty methods, trasportation networks, game theory.
Diplomas	:	Ingeniero Civil Matemático (U. de Chile, 1986) Ph.D. Mathematics (U. Blaise Pascal, 1989) Habilitation à Diriger des Recherches (U. Blaise Pascal, 1990)

1. Vita

- Joined Universidad de Chile as Instructor in 1986. Promoted Assistant Professor in 1989 and Associate Professor in 1994. Full Professor since 1997.

- Associate Professor at Université Blaise Pascal (France) in 1987 and 1989.

- External Profesor of the doctoral program in Optimization and Game Theory at Ecole Polytechnique and Université de Paris 6 (France), 1995-2002.

- Short-term visiting positions:
  Banach Institute (Poland), Ecole Polytechnique (France), INRIA-Rocquencourt (France), Universidad Autónoma de Barcelona (Spain), Université Blaise Pascal (France), Universidade de Campinas (Brazil), Université de Dijon (France), Université de Limoges (France), Université de Montpellier 2 (France), Université de Paris I (France), Université de Paris VI (France), Université de Pau (France), Universidad de la República (Uruguay), Université de Sherbrooke (Canada), Zuse-Institut Berlin (Germany).

2. Research

- 45 research papers in international journals.

  Co-authors: Oscar Alemany (UCH, Chile), Felipe Alvarez (UCH, Chile), Alfred Auslender (U. Lyon 1, France), Hédy Attouch (U. Montpellier 2, France), Jean-Bernard Baillon (U. Paris 1, France), Joseph-Frédéric Bonnans (INRIA, France), Mario Bravo (U. Paris 6, France), Luís Briceño (UCH, Chile), Manuel Cepeda (UCSC, Chile), Patrick Combettes (U. Paris 6, France), José Correa (UCH, Chile), Rafael Correa (UCH, Chile), Cristián Cortés (UCH, Chile), Matías Courdurier (PUC, Chile), Jean-Pierre Crouzeix (U. Blaise Pascal, France), Paulo da Silva (U. Sao Paulo, Brazil), Jean-Pierre Dussault (U. Sherbrooke, Canada), Michael Florian (U. Montréal, Canada), Cristóbal Guzmán (UCH, Chile), Mounir Haddou (U. Orléans, France), Francisco Martínez (UCH, Chile), Walter Mascarenhas (U. Sao Paulo, Brazil), Emerson Melo (CalTech, USA), Christian Michelot (U. Bourgogne, France), Jean-Paul Penot (U. Pau, France), José Manuel Pérez (UCH, Chile), Juan Peypouquet (UTFSM, Chile), Adriana Piazza (UTFSM, Chile), Thomas Rothvoss (EPFL,

Switzerland), Jaime San Martín (UCH, Chile), Alexander Shapiro (GaTech, USA), Sylvain Sorin (U. Paris 6, France), José Soto (UCH, Chile), Nicolás Stier-Moses (Columbia, USA), José Vaisman (UCH, Chile).

- More than 50 invited talks at international scientific meetings, including plenary talks at the following:
  - Ill-posed Variational Problems and Regularization Techniques (Trier, Germany, 1998)
  - Numerical Linear Algebra, Methods for PDE & Optimization (Curitiba, Brazil, 2001).
  - Latin-American Conference on Combinatorics, Graphs & Applications (Santiago, Chile, 2004).
  - 4th Latinamerican Algorithms, Graphs & Optimization Symposium (Pto. Varas, Chile, 2007).
  - 7th Brazilian Workshop on Continuous Optimization (Campinas, Brazil, 2008).
  - 14th Belgian-French-German Conference in Optimization (Leuven, Belgium, 2009).
  - 3rd International Conference on Continuous Optimization (Santiago, Chile, 2010).
  - 47th Australia - New Zealand Industrial & Applied Mathematics (Adelaide, Australia, 2011).
  - 13th Workshop on Well-posedness of Optimization Problems (Borovets, Bulgaria, 2011).
  - Optimization, Games and Dynamics (Paris, France, 2011).
  - 3rd LatinAmerican Workshop on Optimization and Control (Valparaíso, Chile, 2012).
  - XXV Jornada de Matemática de la Zona Sur (Concepción, Chile, 2012).
  - International Conference in Game Theory (Paris, France, 2012).
  - 23rd International Conference on Game Theory (Stony Brook, USA, 2012).
  - 8th Triennal Symposium on Transportation Analysis (San Pedro, Chile, 2013).
  - 4th Workshop on Stochastic Methods in Game Theory (Erice, Italy, 2013).
- Thesis Advising:
  - Mathematical Engineering (U. de Chile): Francisco Ortega, Felipe Alvarez, José Correa, Nicolás Figueroa, Matías Courdurier, José Vaisman, Omar Larré, Cristóbal Guzmán, Felipe Maldonado, Alfredo Torrico.
  - Master in Transportation (U. de Chile): Luis Briceño, Mario Bravo, Pablo Beltrán.
  - Ph.D. Mathematical Modeling (U. de Chile): Felipe Alvarez, José Manuel Pérez, Adriana Piazza.
  - Other: Manuel Cepeda (Ph.D. Transportation Science, U. de Montréal, Canada), Emerson Melo (Master in Economics, U. de Chile, Chile), Isabelle Le Galo (Génie Mathématique, U. Baise Pascal, France), Claire Vilain (Mémoire de DEA, INRIA, France).
- Ph.D. Commitees:

  Martín Matamala (U. de Chile & ENS Lyon, 1994), Oscar Barrientos (U. de Chile & U. Toulouse 3, 1996), Sophie Guillaume (U. Montpellier 2, 1996), Denis Torralba (U. Montpellier 2, 1996), Nourredine Lehdili (U. Montpellier 2, 1996), Yves Lucet (U. Toulouse 3, 1997), Charki Amara (U. Avignon, 1998), Claudia Sagastizábal (U. Paris 1, 1998), Jorge Rivera (U. de Chile & U. Paris 1, 1999), Youssou Gningue (U. Sherbrooke, 1999), César Flores (U. de Chile, 2001), Paul Bosch (U.

de Chile, 2003), Héctor Ramírez (U. de Chile & INRIA-Rocquencourt, 2005), Julien Munier (U. Montpellier 2, 2005), Alexandre Cabot (U. Avignon, 2006), Miguel Carrasco (U. de Chile, 2007), Juan Peypouquet (U. de Chile & U. Paris 6, 2007), Valérie Wajs (U. Paris 6, 2007), Jerôme Bolte (U. Paris 6, 2008), Marc-Olivier Czarnecki (U. Montpellier 2, 2008), Paul-Emile Maingé (U. de Antilles-Guyane 2008), Guillaume Vigeral (U. Paris 6, 2009), Luce Brotcorne (U. Valenciennes, 2010), Luís Briceño (U. Paris 6, 2011), Rida Laraki (U. Paris 6, 2011), Bang Cong Vu (U. Paris 6, 2013), Homero Larraín (PUC, 2013), Pamela Alvarez (PUC, 2013).

3. Teaching

- At Universidad de Chile: undergraduate teaching at the Engineering School (first and second year, mathematical engineering and industrial engineering) and at graduate level in the Ph.D. Program in Mathematical Modeling and Ph.D. Program on Systems Engineering.

- Outside Universidad de Chile: external professor of the doctoral program at Ecole Polytechnique and U. Paris VI (Optimization and Game Theory), and professor of several short graduate courses at Banach Institute (Poland), U. de Limoges (France), U. de la República (Uruguay), U. Nacional de Ingeniería (Perú), U. de Montpellier 2 (France), U. Autónoma de Barcelona (Spain).

4. Scientific Activities

- I have been involved in the organization of 9 international conferences, both in Chile and abroad, as well as 6 summer schools in Chile (3 in optimization, 1 in game theory, and 2 in discrete mathematics).

- Apart from the summer schools, along the years I organized 13 graduate level courses, bringing to Chile some of the best scholars in diverse topics of continuous and discrete optimization, game theory, stochastic analysis, and nonlinear analysis.

- I promoted seminar activities at U. de Chile by launching in 1989 an Optimization Seminar at the Departamento de Ingeniería Matemática, which is still actively running after 20 years. More recently, in 2009, I launched a weekly Discussion Seminar in Algorithms, Combinatorics, Games and Optimization in order to discuss open problems of interest to researchers and graduate students from the Departments of Computer Science, Industrial Engineering and Mathematical Engineering. It has run uninterruptedly every week since 2009.

5. Academic Service

- Associate Editor of Journals:

  - Mathematical Programming (1997-2000).
  - ESAIM Control, Optimisation and Calculus of Variations (2000-2009).
  - Journal of Convex Analysis (since 1993).
  - Revista de Matemáticas Aplicadas (1994-2006).
  - Publicaciones Matemáticas del Uruguay (since 2004).

- Computational and Applied Mathematics (2010-2013).

- Scientific Commitees of Wide-Scope Conferences:
  - 1st International Conference on Continuous Optimization (ICCOPT'2004, 400 participants).
  - 19th International Symposium on Mathematical Programming (ISMP'2006, 1200 participants).
  - 6th International Congress on Industrial & Applied Maths (ICIAM'2007, 3000 participants).
  - 20th Conference of the International Federation of Operational Research Societies (IFORS'2014, 1000 participants).

- Program Commitees of Focused Conferences:
  - 7th & 8th Latin-American Conference in Operations Research (CLAIO'94, CLAIO'98).
  - 5th Triennal Symposium on Transportation Analysis (TRISTAN'04).
  - 5th & 7th French-Latinamerican Congress in Applied Mathematics (FLACAM'98, FLACAM'05).
  - Conférence Internationale de Recherche Opérationnelle (CIRO'99, CIRO'02, CIRO'05).
  - 10th Conference on Parametric Optimization and Related Topics (PARAOPTX'10).
  - Latin-American Workshop on Optimization and Control (LAWOC'08).
  - Workshop on Transport, Optimization, Equilibrium in Economics (OTAE'08).
  - Algorithmic Game Theory: Dynamics and Convergence in Distributed Systems (AlgoGT'10).
  - Workshop on Computational Optimization (WCO'10).
  - International Conference on Network Games, Control and Optimization (NETGCOOP'11).

- Participation in Scientific Panels:
  - Grupo de Estudios de FONDECYT-Matemáticas (1992-1993, 1997-1998),
  - Consejo Superior de Ciencias FONDECYT (1999-2001),
  - Comité de Becas Fondecyt (2003-2004),
  - Comité ECOS-CONICYT (2004),

- Ad-hoc reviewer for over 15 scientific journals, and for the funding agencies NSERC (Canada), Agencia Nacional de Promoción Científica y Tecnológica (Argentina), and Israel Science Foundation (Israel).

6. Academic Administration

- at Departamento de Ingeniería Matemática (U. de Chile):
  - Director of Graduate Studies (1992-1993).
  - Member of Academic Council (1991-1994 and 1997-2004).
  - Chairman (1994-1996).
  - Member of Evaluation Commitee (1997-1999 and 2002-2004).

- at Departamento de Ingeniería Industrial (U. de Chile):
    - Member of Evaluation Commitee (since 2012).
- Other:
    - Board of Directors, Computing Center, U. de Chile (1992-1994).
    - Advisory Board, Presidencia de Conicyt, Mathematical Sciences (1992-1994).
    - Member of Academic Committee, Center for Mathematical Modeling, U. de Chile (2004-2008).
    - Academic Evaluation Committee, Fac. Cs. Físicas y Matemáticas, U. de Chile (2005-2008).
    - Member of Academic Senate, Universidad de Chile (2010-2014).

7. Awards and Distinctions

- *Best Paper Award in Transportation Science* (2002) for the paper "Common-lines and passenger assignment in congested transit networks". Granted by the INFORMS Society to the best contribution in the field of Transportation Science in the past 3 years.
- *Meritorious Service Award* (2004), granted by the journal Operations Research for outstanding refereeing work.
- *Award for Excellence in Teaching* (2004), granted by Universidad de Chile.
- *Best Teacher* (2005,2007,2008,2010), awarded by the students of Mathematical Engineering, Universidad de Chile.

8. Grants and Projects

- My basic research has been mainly funded by 8 Fondecyt grants and through my participation in 2 wide-scope collaborative initiatives: the Center for Mathematical Modeling and the Instituto Sistemas Complejos de Ingeniería. I also obtained several grants to support the Ph.D. program in Mathematical Modeling, the Mathematical Engineering library, a collaborative project in transportation science, and for setting up high performance computational facilities at U. de Chile. Recently, we obtained a grant from Iniciativa Científica Milenio for a collaborative project in the area of algorithms, combinatorics, games and optimization (ACGO).
- In the international dimension I have led 2 ECOS projects linking the Chilean and French communities in the field of optimization, and I also participated as an associate researcher in a third ECOS project and a 2-year grant funded by the European Community. In recent years I served in the scientific council of a large French project that involves 140 researchers in all areas of continuous optimization and game theory.
- I have also worked on several applied R&D projects: optimization in forestry (2 FONDEF grants), airline demand forecast and revenue management (LAN Chile and NCR), embarked systems for automated rail conduction (Ferrocarril Antofagasta-Bolivia), logistics of wineries (Viña San Pedro), and data acquisition and monitoring of transit systems (TranSantiago).

Appendix A: List of Publications

A.1. Publications in Journals

1. Cominetti R., da Silva P. & Mascarenhas W. [2014], *A Newton's method for the continuous quadratic knapsack problem*, to appear in Mathematical Programming Computation.

2. Baillon J.B., Combettes P.L., Cominetti R. [2013], *Asymptotic behavior of compositions of under-relaxed non expansive operators*, to appear in Journal of Dynamics and Games.

3. Cominetti R., Soto J., Vaisman J. [2013], *On the rate of convergence of Krasnosel'skiĭ-Mann iterations and their connection with sums of Bernoullis*, to appear in Israel Journal of Mathematics.

4. Cominetti R., Guzmán C. [2013], *Network congestion control with Markovian multipath routing*, Mathematical Programming, Ser. A, DOI 10.1007/s10107-013-0719-z. Published on-line: 10 December 2013.

5. Baillon J.B., Combettes P.L., Cominetti R. [2012], *There is no variational characterization of the cycles in the method of periodic projections*, Journal of Functional Analysis 262(1), pp. 400-408.

6. Cominetti R., Correa J., San Martín J., Rothvoss T. [2010], *Optimal selection of customers for a last-minute offer*, Operations Research 58(4), pp. 878–888.

7. Cominetti R., Melo E. & Sorin S. [2010], *A payoff-based learning procedure and its application to traffic games*, Games and Economic Behavior 70, pp. 71–83.

8. Bravo M., Briceño L., Cominetti R., Cortés C., Martínez F. [2010], *An integrated behavioral model of the land-use and transport systems with network congestion and location externalities*, Transportation Research Part B: Methodological 44(10), pp. 584–596.

9. Cominetti R. & Piazza A. [2009], *Asymptotic convergence of optimal policies for resource management with application to harvesting of multiple species forest*, Mathematics of Operations Research 34(3), pp. 576-593.

10. Cominetti R., Correa J. & Stier-Moses N. [2009], *The impact of oligopolistic competition in networks*, Operations Research 57(6), pp. 1421–1437.

11. Baillon J.B. & Cominetti R. [2009], *Asymptotic expansion of penalty-gradient flows in linear programming*, SIAM J. on Optimization 20(2), pp. 728–739.

12. Cominetti R., Peypouquet J. & Sorin S. [2008], *Strong asymptotic convergence of evolution equations governed by maximal monotone operators with Tikhonov regularization*, Journal of Differential Equations 245(12), pp. 3753–3763.

13. Briceño L., Cominetti R., Cortés C., Martínez F. [2008], *An integrated behavioral model of land use and transport system: a hyper-network equilibrium approach*, Networks and Spatial Economics 8, pp. 201-224.

14. Baillon J.B. & Cominetti R. [2008], *Markovian traffic equilibrium*, Mathematical Programming Ser. B 111(1-2), 35–36.

15. Cepeda M., Cominetti R. & Florian M. [2006], *A frequency-based assignment model for congested transit networks with strict capacity constraints: characterization and computation of equilibria*, Transportation Research B 40(6), pp. 437-459.

16. Cominetti R. & Courdurier M. [2003], *Coupling general penalty schemes for convex programming with the steepest descent and the proximal point algorithm*, SIAM Journal on Optimization 13(3), pp. 745-765.

17. Alvarez F. & Cominetti R. [2002], *Primal and dual convergence of a proximal point exponential penalty method for linear programming*, Mathematical Programming 93(1), pp. 87–96.

18. Baillon J.B. & Cominetti R. [2001], *A convergence result for non-autonomous subgradient evolution equations and its application to the steepest descent exponential penalty trajectory in linear programming*, Journal of Functional Analysis 187(2), pp. 263–273.

19. Cominetti R. & Correa J. [2001], *Common-lines and passenger assignment in congested transit networks*, Transportation Science 35(3), pp. 250–267.

20. Attouch H. & Cominetti R. [1999], *L^p approximation of variational problems in L^1 and L^∞*, Nonlinear Analysis Ser. A 36(3), Theory Methods, pp. 373-399.

21. Bonnans J-F., Cominetti R. & Shapiro A. [1999], *Second order optimality conditions based on parabolic second order tangent sets*, SIAM Journal on Optimization 9(2), pp. 466–492.

22. Cominetti R. & Alemany O. [1999], *Steepest descent evolution equations: asymptotic behavior of solutions and rate of convergence*, Transactions of the AMS 351(12), pp. 4847-4860.

23. Bonnans J-F., Cominetti R. & Shapiro A. [1998], *Sensitivity analysis of optimization problems under second order regular constraints*, Mathematics of Operations Research 23(4), pp. 806-831.

24. Auslender A., Cominetti R. & Haddou M. [1997], *Asymptotic analysis for penalty and barrier methods in convex and linear programming*, Mathematics of Operations Research 22(1), pp. 43–62.

25. Cominetti R. [1997], *Coupling the proximal point algorithm with approximation methods*, Journal of Optimization Theory and Applications 95(3), pp. 581-600.

26. Cominetti R. & Michelot C. [1997], *Sufficient conditions for coincidence in ℓ_1-multifacility location problems*, Operations Research Letters 20(4), pp. 179–185.

27. Cominetti R. & Penot J-P. [1997], *Tangent sets of order one and two to the positive cones of some functional spaces*, Applied Mathematics & Optimization 36(3), pp. 291–312.

28. Cominetti R. & Pérez J-M. [1997], *Quadratic rate of convergence for a primal-dual exponential penalty algorithm*, Optimization 39(1), pp. 13–32.

29. Attouch H. & Cominetti R. [1996], *A dynamical approach to convex minimization coupling approximation with the steepest descent method*. Journal of Differential Equations 128(2), pp. 519–540.

30. Bonnans J-F. & Cominetti R. [1996], *Perturbed optimization in Banach spaces III. Semi-infinite optimization*, SIAM Journal Control & Optimization 34(5), pp. 1555-1567.

31. Bonnans J-F. & Cominetti R. [1996], *Perturbed optimization in Banach spaces II. A theory based on a strong directional constraint qualification.* SIAM Journal on Control and Optimization 34(4), pp. 1172–1189.

32. Bonnans J-F. & Cominetti R. [1996], *Perturbed optimization in Banach spaces I. A general theory based on a weak directional constraint qualification.* SIAM Journal on Control and Optimization 34(4), pp. 1151–1171.

33. Cominetti R. [1995], *Asymptotic convergence of the steepest descent method for the exponential penalty in linear programming.* Journal of Convex Analysis 2(1-2), pp. 145–152.

34. Cominetti R. & Penot J-P. [1995], *Tangent sets to unilateral convex sets.* CRAS Paris 321(12), pp. 1631–1636.

35. Cominetti R. [1994], *Some remarks on convex duality in normed spaces with and without compactness*, Control & Cybernetics 23(1-2), pp. 123–138.

36. Cominetti R. & Dussault J-P. [1994], *A stable exponential-penalty algorithm with superlinear convergence.* J. Opt. Theory & Appl. 83(2), pp. 285–309.

37. Cominetti R. & San Martín J. [1994], *Asymptotic analysis of the exponential penalty trajectory in linear programming*, Math. Programming 67(2), pp. 169–187.

38. Auslender A., Cominetti R. & Crouzeix J-P. [1993], *Convex functions with unbounded level sets and applications to duality theory.* SIAM Journal on Optimization 3(4), pp. 669–687.

39. Auslender A. & Cominetti R. [1991], *A comparative study of multifunction differentiability with applications in mathematical programming.* Mathematics of Operations Research 16(2), pp. 240–258.

40. Cominetti R. [1991], *On Pseudo-differentiability.* Transactions of the AMS 324(2), pp. 843–865.

41. Auslender A. & Cominetti R. [1990], *First and second order sensitivity analysis of nonlinear programs under directional constraint qualification conditions.* Optimization 21(3), pp. 351–363.

42. Cominetti R. [1990], *Metric regularity, tangent sets and second order optimality conditions.* Applied Mathematics & Optimization 21(3), pp. 265–287.

43. Cominetti R. & Correa R. [1990], *A generalized second order derivative in nonsmooth optimization.* SIAM Journal on Control & Optimization 28(4), pp. 789–809.

44. Cominetti R. & Correa R. [1988], *A useful characterization of Clarke derivatives.* Differential and Integral Equations 1(4), pp. 381–390.

45. Cominetti R. & Correa R. [1986], *Sur une dérivée seconde en analyse non différentiable.* C.R.A.S. Paris Série I 303(17), pp. 861–864.

A.2. Refereed Conference Proceedings

1. Cominetti R. & Guzmán C. [2011], *Network congestion control with Markovian multipath routing.* in Proceedings of the 5th International Conference on Network Games, Control and Optimization (NetGCOOP'2011, Paris), IEEE CFP1186R-PRT, pp. 93-100.

2. Cominetti R., Correa J. & Larré O. [2011], *Existence and uniqueness of equilibria for flows over time*. 38th International Colloquium on Automata, Languages and Programming (ICALP'2011), Lecture Notes in Computer Science 6756, pp. 552-563.

3. Cominetti R., Correa J. & Stier-Moses N. [2006], *Network games with atomic players*. 33rd International Colloquium on Automata, Languages and Programming (ICALP'2006), Lecture Notes in Computer Science 4051, pp. 525–536.

4. Cominetti R. [1999], *Nonlinear averages and convergence of penalty trajectories in convex programming*. Workshop on Ill–posed Variational Problems and Regularization Techniques, Trier, 1998, Lecture Notes in Economics and Mathematical Systems 477, Springer-Verlag, pp. 65–78.

A.3. Book Chapter

1. Cominetti R. & San Martín J. [2007], *A model for the space-time spread of pine shoot moth*. Handbook of Operations Research in Natural Resources, A. Weintraub *et al.* Eds., International Series in Operations Research & Management Science, Vol. 99, Springer-Verlag, pp. 511–524.

A.4. Book

1. Cominetti R., Facchinei F. & Lasserre J.B., **Modern Optimization Modelling Techniques**, Series Advanced Courses in Mathematics CRM Barcelona, A. Daniilidis, J.E. Martinez-Legaz (Eds), Birkhauser, Springer Basel (2012). ISBN 978-3-0348-0290-1, DOI: 10.1007/978-3-0348-0291-8.

Appendix B: Student Advising

B.1. Master and Engineering Thesis

1. Alfredo Torrico, *Medidas de Riesgo y su Aplicación a Ruteo en Redes bajo Incertidumbre*, Ingeniería Civil Matemática, U. de Chile, 2013.
2. Felipe Maldonado, *Estudio de una Dinámica Adaptativa para Juegos Repetidos y su Aplicación a un Juego de Congestión*, Ingeniería Civil Matemática, U. de Chile, 2012.
3. Pablo Beltrán, *Congestión y Equilibrio en Redes de Transporte Público*, Magister en Transporte, U. de Chile, 2012.
4. Cristóbal Guzmán, *Un Modelo de Equilibrio para Ruteo y Control de Flujo en Redes de Comunicaciones*, Ingeniería Civil Matemática, U. de Chile, 2010.
5. Omar Larré, *Equilibrios Dinámicos de Flujo en Redes*, Ingeniería Civil Matemática, U. de Chile, 2010.
6. Mario Bravo, *An Integrated Model for Land Use and Transportation System with Externalities*, Master in Transportation Science, Universidad de Chile, 2007.
7. Emerson Melo, *Equilibrium and Learning in Transportation Networks*, Master in Economics, U. de Chile, 2006.
8. Luis Briceño, *An Integrated Model for Transport and Land Use: a Network Based Approach*, Master in Transportation Science, U. de Chile, 2006.
9. José Vaisman, *Convergencia Fuerte del Método de Medias Sucesivas para Operadores Lineales No Expansivos*, Ingeniería Civil Matemática, U. de Chile, 2005.
10. Marleen van Rijsbergen, *A Stochastic Traffic Assignment Model in Practice*, Mathematical Engineering, Universiteit Twente, The Netherlands, 2004.
11. Matías Courdurier, *Análisis Asintótico en Penalización Convexa*, Ingeniería Civil Matemática, U. de Chile, 2001.
12. Nicolás Figueroa, *Algunos Juegos Estocásticos con Información Completa e Incompleta*, Ingeniería Civil Matemática, U. de Chile, 2000.
13. José Correa, *Asignación de Flujos de Pasajeros en Redes de Transporte Público Congestionadas*, Ingeniería Civil Matemática, U. de Chile, 1999.
14. Isabelle Le Galo, *Optimisation de la Planification du Développement du Réseau de Distribution Eléctrique*, Génie Mathématique et Modélisation, U. Blaise Pascal, France, 1998.
15. Felipe Alvarez, *Métodos Continuos en Optimización Paramétrica: el Método de Newton y Aplicaciones a la Optimización Estructural*, Ingeniería Civil Matemática, U. de Chile, 1998.
16. Claire Vilain, *Optimisation des Réseaux Electriques en Très Haute Tension*, Master Thesis (Mémoire de DEA), Applied Mathematics, INRIA-Rocquencourt, France, 1998.

17. Francisco Ortega, *Método de Ramificación y Acotamiento para Problemas de Flujo en Grafos con Costos Cóncavos. Aplicación a la Optimización de Faenas de Explotación Forestal*, Ingeniería Civil Matemática, U. de Chile, 1996.

B.2. Ph.D. Thesis

1. Adriana Piazza, *Mathematical Models for the Optimal Management of Renewable Natural Resources: an Application to the Sustainable Exploitation of a Mixed Forest*, Ph.D. Mathematical Modeling, U. de Chile, 2007 (co-advisor: Pierre Cartigny).

2. Manuel Cepeda, *Modèle d'Equilibre dans les Réseaux de Transport en Commun: le Cas des Capacités Explicites des Services*, Ph.D. Département d'Informatique et Récherche Opérationnelle, U. de Montréal, Canada, 2002 (co-advisor: Michael Florian).

3. José Manuel Pérez, *Convergence of Descent Algorithms and Approximation Methods for Convex Optimization Problems*, Ph.D. Mathematical Modeling, U. de Chile, 1999.

4. Felipe Alvarez, *Dissipative Dynamical Systems and Approximation Methods in Convex Optimization*, Ph.D. Mathematical Modeling, U. de Chile, 1998 (Co-advisor: Hédy Attouch). Best Doctoral Thesis Award, Chilean Academy of Sciences.

B.3. Postdoctoral advisees:

1. Mourad Baiou, *Polyhedral combinatorics*, (1999–2000).

2. Germain Tanoh, *Simulation of Queuing Networks for Transit Systems*, (2005).

3. Frédéric Babonneau, *Interior Point Methods and Traffic Equilibrium*, (2006–2007).

4. Thomas Boulogne, *Learning and Adaptation in Games*, (2006–2007).

5. Flavio Guíñez, *Optimization and combinatorial methods in discrete tomography and economics*, (2012-2013).

6. Mario Bravo, *Adaptive procedures in games and population dynamics: methods and applications*, (2013-2015).

B.4. Current positions of former students:

My former students have followed successful careers both in academia and industry.

Felipe Alvarez is Associate Professor at Universidad de Chile and he is currently the Vice-Dean of the Facultad de Ciencias Físicas y Matemáticas. José Correa is also Associate Professor at Universidad de Chile and Director of Graduate Studies at the Department of Industrial Engineering, while Manuel Cepeda is the Director of Industrial Engineering at U. Católica de la Santísima Concepción. Matías Courdurier moved back to Chile after some years as Assistant Professor at Columbia University, and is now Assistant Professor at Pontificia Universidad Católica de Chile. Nicolás Figueroa and Adriana Piazza are Assistant Professors at Pontificia Universidad Católica de Chile and Universidad Federico Santa María respectively.

In the private sector, Francisco Ortega developed a successful career in the area of operations research in Belgium and he is now the Software Development Manager at the company OM Partners. Also, José Vaisman founded his own company in Chile in the area of financial engineering, Marleen van Rijsbergen went back to The Netherlands where she works as a manager for TNT Post, while Isabelle Le Galo moved to Spain where she founded her own company in the area of communications.

Among the more recent students, Luis Briceño completed a Ph.D. in optimization at U. Paris 6 and was recently appointed as Assistant Professor at Pontificia Universidad Católica de Chile. Also, Mario Bravo completed his Ph.D. in game theory at U. Paris 6 and is now a Postdoctoral Fellow at Universidad de Chile, while Emerson Melo completed his Ph.D. in economics at CalTech and is now a postdoc at Cornell University. Cristóbal Guzmán is a Ph.D. student in optimization at Georgia Tech, while Omar Larré completed a Master degree at Universidad de Chile and now works on the private sector.

Concerning the postdoctoral fellows, Germain Tanoh is the founder and president of Quantimal Consulting, a company based in Vancouver Canada, Frédéric Babonneau went back to Switzerland where he works for the company Ordecsys specialized in consulting in the area of optimization and operations research, while Thomas Boulogne returned to France and works in the banking sector.

José Manuel Pérez passed away in 2010.

Appendix C: Research Grants and Projects

C.1. Individual Basic Research Grants

1. Fondecyt 1900945: *Sensitivity of parametric programs and penalty methods* (1990-1991).
2. Fondecyt 1920947: *Optimization of convex functions without inf-compactness conditions* (1992).
3. Fondecyt 1931100: *Interior point methods in linear programming and extensions* (1993).
4. Fondecyt 1940564: *Parametric optimization in Banach spaces* (1994-1995).
5. Fondecyt 1961131: *Dissipative evolution equations and discrete methods for convex programming* (1996-1997).
6. Fondecyt 1981052: *Penalty functions and complexity of path-following methods in convex programming* (1998-2000).
7. Fondecyt 1100046: *Adaptive dynamics and equilibrium in network flow games* (2010-2012).
8. Fondecyt 1130564: *Iterations of non-expansive maps and sums of Bernoullis* (2013-2016).
9. Fundación Andes C–123454: *Numerical methods for conxex programming* (1992).
10. Fundación Andes C-129992: *Approximation and penalty methods* (1996).
11. DTI – U. de Chile: *Stable penalty algorithms for mathematical programming* (1993).

C.2. Collaborative Research Grants

1. Accreditation of the Ph.D. Program in Mathematical Modeling with Conicyt and Fundación Andes, and obtention of a US$ 20.000 grant for the library and graduate program (1990).
2. Donation from Digital Equipment Corp. of US$150.000 in computational equipment to support research and teaching at the Departamento de Ingeniería Matemática, U. de Chile (1991).
3. *Centro de Modelamiento Matemático* (CMM) (1999-2008). This 10-year project, funded by the Chilean government through the FONDAP program with a yearly budget of US$1 million, was aimed to establish a research center to boost the development of applied mathematics in Chile. It involved more than 20 researchers from Universidad de Chile and 8 researchers from U. de Concepción. The grant allowed to build physical facilities, fund Ph.D. students and postdocs, visiting professors, conferences, and in general to support research in applied mathematics. I was part of the team of main researchers and was responsible for the research in Continuous and Combinatorial Optimization. During the period 2004-2008 I served in the Academic Committee of CMM. I was also involved in the successful application for a new grant for the period 2009-2018 funded by Programa de Financiamiento Basal (CONICYT). I resigned from CMM in 2009.
4. *Development of the Ph.D. Program in Mathematical Modeling* (2001-2004). This project, funded through Mecesup grant 0009, was intended to strenghten the international dimension of the Ph.D. Program at the Departamento de Ingeniería Matemática. The grant allowed to cover 4 Ph.D. scholarships for latinamerican students, and to organize 4 summer schools.

5. *Laboratory on Dynamics, Uncertainty, Equilibrium and Information on Networks* (2004-2005). This grant from Fundación Andes, obtained in collaboration with A. Jofré and A. Maass, provided US$400.000 for buying hardware to create a high performance computing facility (parallel processing and grid computing). This initiative eventually evolved into the High Performance Computing Lab at the Center of Mathematical Modeling.

6. *Network Modeling for Urban Systems* (2006-2007). This was a 2 year project to foster collaborations in the area of Transportation Research, by connecting the teams at the Center for Mathematical Modeling and the Department of Civil Engineering. The project was funded by the Chilean government through a grant from Programa Bicentenario de Ciencia y Tecnología.

7. *Instituto Sistemas Complejos en Ingeniería* (2007-2012). This is a long term project which involves more than 30 researchers from 4 different Chilean universities in the areas of operations research, applied mathematics, transportation science, logistics, electrical energy, and economics. I participate in the role of Senior Scientist. The project is mainly funded through a grant from Iniciativa Científica Milenio as well as the Programa de Financiamiento Basal, with total budget of approximately US$3 million per year.

8. *Information and Coordination in Networks* (2011-2013). This is a recently approved grant in the area of algorithmic game theory with a focus on networks. The project involves 10 researchers from the areas of theoretical computer science, discrete mathematics, optimization, and game theory. The project will be funded as a Núcleo by Iniciativa Científica Milenio with a total budget of US$1.7 million.

C.3. International Collaboration

1. *Optimisation: théorie, méthodes et applications* (1994-1998). The research involved the study of maximal monotone operators, approximation methods and dynamical systems in optimization, location problems, nonsmooth analysis and mathematical economics. The project was developed in collaboration between 10 French researchers and 7 Chilean researchers. It was funded by the French and Chilean governments through two successive ECOS-Conicyt grants C94E01 and C96E08.

2. *Parametric optimisation and applications* (1996-1998). In collaboration with A. Jofré (U. de Chile), J-F. Bonnans (INRIA) and L. Thibault (U. Montpellier 2), to study sensitivity theory for parametric optimization problems. Funded by the European Community through grant CCE-931091-CL.

3. *Existence, approximation et comportement limite en optimisation et problèmes d'équilibre* (2005-2008), Project ECOS C00E05, Principal Investigators: F. Alvarez & H. Attouch

4. *Groupe de Recherche Mathématiques de l'Optimisation et Applications* (2008-2011). This project involves 140 researchers from French institutions working in the field of optimization. I participate as a collaborator and as a member of the Scientific Council integrated by H. Attouch (France), R. Cominetti (Chile), I. Ekeland (France), M. Fukushima (Kyoto, Japan), J.-B. Hiriart-Urruty (France), J.-B. Lasserre (France), A. S. Lewis (USA), A. Nemirovski (USA), J.-S. Pang (USA), M. Théra (France), H. Wolkowicz (Canada). The project is funded by the French government through the grant GdR-3273-MOA.

C.4. Applied Projects

1. *Optimization and Management in the Forestry Industry* (1993-1999). The project dealt with different aspects of the planning of forestry activities: daily scheduling of operations, transportation network design, network flow optimization, fleet scheduling, optimal cutting stock, selection and location of extraction machinery, stochastic modelling for pest management. The project was carried out by a team involving 9 researchers from U. de Chile and 10 engineers from 4 chilean forestry companies. Funded by Conicyt, U. de Chile, Forestal Arauco, and Forestal Millalemu, through two successive FONDEF grants D91I1045 and D96I1020.

2. *Airline demand forecast and revenue management* (2004). The project developed analytic tools for the statistical estimation of airline demand required by the revenue management systems, as well as the optimal selection of customers for upgrade programs and promotional sales. The research was done by a team of 3 researchers, under contract with the chilean carrier LAN Airlines and the hardware provider NCR.

3. *Embarked systems for automated rail conduction* (2005-2006). The project developed an embarked system for the automatic guidance of the freight trains of Ferrocarril Antofagasta-Bolivia (FCAB), which provides transport of copper and sulfuric acid for CODELCO's copper mine Chuquicamata in the north of Chile. The research was developed under contract with FCAB.

4. *Logistics in the winery industry* (2008). The project developed mathematical models for the optimal operation of a winery. This involved the handling of vats of different wine varieties to fulfill the pending orders over a moving horizon while minimizing the losses and spillovers, as well as the optimal scheduling of the bottling processes for final products. The project was carried out by a team of 4 researchers under contract with Viña San Pedro, the second largest Chilean winery.

5. *Data acquisition and monitoring of transit systems* (2009-2010). The project aim was to develop algorithms and software to exploit the database of daily transactions in Santiago's transit system. This huge database contains detailed data on the space-time location of buses and traveler boardings, and is used to derive statistical estimations on the system performance as well as travel demand profiles in the form of origin-destination trip matrices. The project was done in collaboration with 3 researchers form the Department of Civil Engineering and 2 engineers from TranSantiago.

Appendix D: Teaching

D.1. Undergraduate teaching

1. Undergraduate courses at the School of Engineering of U. de Chile:

   - Calculus (1991,1995,1998-2000,2003,2009)
   - Vector Calculus (1992,1993,1996-2001,2005,2008-2010)
   - Transportation Networks (2001,2002)
   - Game Theory (1998,2009,2010)
   - Modeling and Optimization (2011-2013)

   My original course notes for Calculus (first year) and Vector Calculus (second year) have been in use since 1992. Along the years these notes have evolved with many additions and contributions from other colleagues.

2. Undergraduate courses of Mathematical Engineering at U. de Chile:

   - Topology (1994,2001,2002,2004,2007,2010)
   - Combinatorial Optimization (1992,1994,1997,2007)
   - Non-linear Optimization (1991-1993,2002-2004,2008)
   - Calculus of Variations and ODE's (1996)
   - Graph Theory and Applications (1994)

D.2. Graduate teaching

1. Courses in the Ph.D. program in Mathematical Modeling at U. de Chile:

   - Convex Analysis (1993,1994,1996,1997,1999,2005-2007,2010)
   - Optimization and dynamical systems (2001-2004)
   - Game theory and population dynamics (2003-2004)

2. Courses in the Ph.D. program in Systems Engineering at U. de Chile:

   - Algorithmic Game Theory (2009-2013)
   - Convexity and Applications (2012-2013)
   - Models and Algorithms in Optimization (2012-2013)

3. Course in the Ph.D. in Game Theory and Optimization at Ecole Polytechnique & U. Paris 6:

   - Dynamical and Approximation Methods in Convex Optimization (1996-2003)

4. Other graduate short courses

   - Perturbed optimization in Banach spaces (8 hrs), Banach Center, Polish Academy of Science, Warsaw, Poland, 1993.

- Introduction to Mathematical Programming (8 hrs), U. de Santiago, Chile, 1993.
- Introduction to Convex Analysis (25 hrs), U. de la República, Montevideo, Uruguay, 1994.
- Combinatorial Optimization (25 hrs), U. de la República, Montevideo, Uruguay, 1994.
- Evolution Equations in Optimization (8 hrs), Université de Limoges, France, 1995.
- Transport Network Equilibrium (6 hrs), CIMPA School , Lima, Perú, 2004.
- Equilibrium and Learning in Transport Networks (6 hrs), Centre de Recerca Matematica, Barcelona, Spain, 2009.

Appendix E: Organization of Scientific Activities

E.1. Organizing Committees of Conferences

- *French-Latinamerican Conference in Applied Mathematics* (FLACAM). This series of conferences aims to foster the scientific connections between France and Chile in applied mathematics at large. I was co-organizer for the 2nd, 5th and 7th versions of the conference, all three held in Santiago (Chile) in the years 1992, 1998, and 2005 respectively.

- *3rd International Conference on Continuous Optimization* (ICCOPT'10, Santiago, Chile, 2010). This is the major conference in continuous optimization organized every 3 years by the Mathematical Programming Society, alternating with the Integer Programming and Combinatorial Optimization (IPCO), and the International Symposium on Math Programming (ISMP) which combines both continuous and discrete optimization. We organized the 3rd version of ICCOPT, following the previous versions at Rensselaer Polytechnic Institute in Troy (USA), and MacMaster University in Hamilton (Canada).

- *Journées Franco-Chiliennes d'Optimisation* (JFCO). Together with Michel Théra we launched a series of workshops for French and Chilean researchers in the field of Optimization to meet regularly. I was co-organizer for the first and second versions which were held respectively at U. de Limoges (Limoges, 1995) and the Institut Henri Poincaré (Paris, 1997). The following versions were organized by other colleagues and took place in Avignon (1998), Montpellier (2003), Dijon (2006), and Toulon (2008).

- *Workshop on Dynamics, Optimization and Learning*, Instituto de Sistemas Complejos (Valparaíso, 2010). The workshop, co-organized by P.L. Combettes, R. Cominetti and J. Correa, was held in place of the JFCO and was sponsored by the Project Mathématiques de l'Optimisation et Applications (GdR-3273-MOA).

- *Workshop on Transportation*, Santiago, Chile, 2005.

- *Workshop on Urban Dynamics* (URBANICS'10), Maitencillo, Chile, 2010.

- *Algorithms, Dynamics, Games and Optimization* (ADGO'2013), Playa Blanca, Chile, 2013.

E.2. Research Seminars

- In 1989 I created a weekly Optimization Seminar at the Departamento de Ingeniería Matemática. The seminar run during 1989-1990 and was then transformed into a wider scope Mathematics Seminar at Universidad de Chile, jointly with the Faculty of Sciences. The latter was in turn changed into the Seminar of the Departamento de Ingeniería Matemática between 1994-1997, and in 1998 it was split into several more focused thematic seminars. The original seminar was re-inaugurated under the name of Optimization & Equilibrium Seminar, which continues until today.

- In 2009, I launched a weekly Seminar in Algorithms, Combinatorics, Games and Optimization (ACGO) in order to create a discussion forum for the researchers and graduate students of the Departments of Computer Science, Industrial Engineering and Mathematical Engineering. In contrast with a standard seminar, this activity is structured as informal discussions of open problems and their ongoing research, and it has run uninterruptedly for over three years now.

E.3. Organization of Summer Schools

- *1st Chile-CEE School in Optimization* (1992). Courses given by H. Attouch (U. Montpellier, France, "Variational convergences in optimization"), A. Celllina (U. de Trieste, Italy, "Existence in the calculus of variations"), J. Dennis (Rice University, USA, "Algorithms in mathematical programming"), C. Gonzaga (UFRJ, Brazil, "Interior point methods in linear programming"), and R.T. Rockafellar (U. Washington, USA, "Deterministic and stochastic linear-quadratic programming").

- *2nd Chile-CEE School in Optimization* (1998). Courses given by G. Buttazzo (U. de Pisa, Italy, "Shape optimization"), I. Ekeland (U. Paris-Dauphine, France, "Inverse problems in optimization theory and microeconomics"), M. Goemans (MIT, USA, "Semidefinite programming and combinatorial optimization"), M. Groetschel (ZIB, Germany, "Combinatorial optimization"), J.Ph. Vial (U. Geneva, Switzerland,"Nondifferentiable optimization: an interior point perspective"), and R. Wets (U.C. Davis, USA, "Lectures on Stochastic Programming").

- *3rd Chile-CEE School in Optimization* (2005). Courses given by F. Bonnans (INRIA, France, "Numerical methods for stochastic control problems"), P. L'Ecuyer (IRO-UM, Canada, "Stochastic simulation"), M. Goemans (MIT, USA, "Stochastic combinatorial optimization"), J.B. Lasserre (CNRS, France,"Theory of moments and sum-of-squares with applications in global optimization"), and J.S. Pang (RPI, USA, "Differential variational inequalities").

- *Summer School on Game Theory* (2008). Courses given by E. Stacchetti (NYU, USA, "Reputation games"), and J-P. Montero (PUC, Chile, "Games in forward markets: exhaustible resources and pollution").

- *5th Summer School in Discrete Mathematics* (2010). Courses given by F. Eisenbrand (EPFL, Switzerland, "Geometric optimization problems"), G. Salazar (U. Autónoma Potosí, México,"An introduction to topological graph theory"), and E. Stacchetti (New York University, USA,"Games with reputational perturbations")

- *6th Summer School in Discrete Mathematics* (2011). Courses given by J.B. Lasserre (LAAS-CNRS, France, "Moments, positive polynomials and semi-definite programming"), L. Rademacher (Ohio State Univ., USA, "Randomized algorithms and matrix decompositions"), and M. Habib (U. Paris 7, France, "Efficient graph algorithms and applications").

E.4. Organization of graduate courses by external professors at U. de Chile

- Fixed point theory, Marc Lassonde (U. Blaise Pascal), April 1991.
- Global optimization, Rachid Ellaia (U. de Rabat), August 1991.
- Stochastic control theory, Jean-Pierre Lepeltier (U. de Le Mans), April 1992.
- Path following methods in linear programming, Clovis Gonzaga (UFRJ, Brasil), Dec. 1992.
- The proximal method and monotone operators, Bernard Lemaire (U. Montpellier), Dec. 1994.
- Topics in collective and strategic decision, Michel Balinski (Ecole Polytechnique), Dec. 1994.
- Mixed-integer programming and polyhedral combinatorics, Laurence Wolsey (U. Louvain), September 1997.
- Submodular functions in plant location and network design, Francisco Barahona (IBM-Watson), Dec. 1997.

- Stochastic games, Sylvain Sorin (U. Paris 6), May-August 1998.
- Decomposition methods for integer LP's, Monique Guignard (Wharton), March-April 1999.
- Polyhedral combinatorics for network design with reliability constraints, Rida Mahjoub (U. Blaise Pascal), May 1999.
- Marriage and college admission problem, Mourad Baiou (U. Blaise Pascal), June-July 1999.
- Semigroups and bifurcations, Jean-Bernard Baillon (U. Paris 1), March-June 2002.