

## CURRICULUM VITAE

### PERSONAL

Name : FABIÁN FLORES-BAZÁN  
Birthdate : April 24, 1964  
Citizenship : Peruvian  
Address : Universidad de Concepción,  
Facultad de Ciencias Físicas y Matemáticas,  
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### EDUCATION

B.Sc. Mathematics  
Universidad Nacional de Ingeniería (U.N.I.)  
Faculty of Sciences, Lima - Perú, May 1987.  
Ph.M. International School for Advanced Studies, Trieste - Italy, October 1990.  
Thesis topic: Non-convex symmetric problems in the Calculus of Variations  
(*cum laude*).  
Thesis adviser: Professor Arrigo Cellina.  
Ph.D. International School for Advanced Studies, Trieste - Italy, October 1992.  
Thesis topic: Relaxation and Non-convex problems in the Calculus of Variations.  
Thesis adviser: Professor Arrigo Cellina.  
Licenciate Mathematics  
Universidad Nacional de Ingeniería  
Faculty of Sciences, Lima - Perú, August 1993.  
Thesis topic: Dualidad en Optimización No-convexa y Aplicaciones  
(*excellence*).

### SCIENTIFIC EMPLOYMENT AND ACADEMIC RESPONSABILITY

4/84 to 4/87: Assistant Student, Faculty of Sciences, U.N.I.. Lima - Perú. Courses on: Differential and Integral Calculus. Real Analysis.

6/87 to 11/88: Assistant Professor, Faculty of Sciences, U.N.I.. Lima - Perú. Teaching on: Real and Complex Analysis, Introduction to the Ordinary/Partial Differential Equations.

8/87 to 9/88: M.Sc. Student, Universidad Nacional de Ingeniería, Faculty of Sciences. Supervisor: Professor Eugen Blum. Subject: Optimization Theory.

10/88 to 10/92: Ph.D. Student, International School for Advanced Studies. Trieste - Italy. Supervisor: Professor Arrigo Cellina.

11/92 to 04/94: Associate Professor, Faculty of Sciences, U.N.I. Lima - Perú. Teaching on Postgraduate courses: Topology, Calculus of Variations and Optimization theory.

04/94 to 12/99 Associate Professor, Department of Mathematical Engineering, Faculty of Physical and Mathematical Sciences, University of Concepción. Concepción - Chile. Teaching on Pre and Postgraduate courses: Linear/Nonlinear Mathematical Programming, Calculus of Variations and Optimization. Permanent Member of the Doctorate Program in Applied Sciences with major on Mathematical Engineering.

01/2000 to present Full Professor (Profesor Titular), Department of Mathematical Engineering, Faculty of Physical and Mathematical Sciences, University of Concepción. Concepción - Chile. Teaching on Pre and Postgraduate courses: Linear/Nonlinear Mathematical Programming, Calculus of Variations and Optimization. Permanent Member of the Doctorate *Program in Applied Sciences with major on Mathematical Engineering*.

03/2000 to 12/2018 Associate Researcher, Centre for Mathematical Modeling, School of Engineering, University of Chile. Santiago - Chile

01/1998 to 12/2005; 01/2009 to 12/2014 Regular Associate Member, The Abdus Salam International Centre for Theoretical Physics, Trieste - Italy.

## RESEARCH INTERESTS

- Optimization theory: existence, strong duality, first and second order optimality conditions, duality theory.
- Convex analysis and first and second order asymptotic analysis in convex and quasi-convex optimization;
- Calculus of Variations without convexity or coercivity.

## DISTINCTIONS RECEIVED/ACADEMIC HONORS

• Honored as a Distinguished Guest at *Universidad Nacional de Trujillo*, in occasion of delivering a conference on July 22, 2014 at Departamento de Matemática.

• Special Recognition at *Universidad de Concepción* for receiving continuously support by FONDECYT - conicyt as a Principal Investigator. Vicerrectoría de Investigación. April 2013.

• Keynote Speaker at the *2nd International Conference of Nonlinear Analysis and Optimization* (NAOP2009), Department of Mathematics, University of Isfahan, Isfahan - Iran, May 13-15, 2009.

• Distinguished Lecturer at the *2nd Summer School* in occasion of the *9th Conference on Generalized Convexity and Generalized Monotonicity*, Kaohsiung, Taiwan ROC, July 15 - 19, 2008.

• Regular Associate member of the *Abdus Salam International Centre for Theoretical Physics*, Trieste - Italy for the period 1998–2005; 2009–2014:

• Corresponding Member of *Academia Nacional de Ciencia y Tecnología* (ANCyT), Lima - Perú, since March 2005.

• Honorary Professor at *Universidad Nacional Pedro Ruiz Gallo*, Lambayeque - Perú, since September 2008.

• Honorary Associate Member of the *Sociedad Peruana de Matemática Aplicada y Computacional* (SPMAC), Lima - Perú, since February 2006.

• Prize in Sciences 2007 awarded from the Concepción Municipal Government, Concepción, Chile, October 2007.

- Plenarist at LXVI Encuentro Nacional de la Sociedad de Chile, Selected young researcher by the Chilean Mathematical Society, Valparaíso-Chile, October 28-29, 1994.
- Frontiers of Science (Chilean Academy of Sciences), Selected young member, 2007 – 2009.
- Member of the Mathematics Adviser Committee at FONDECYT, *National Commission for Scientific and Technological Research* (CONICYT - Chile), May 2006 - June 2010.
- Honored as a Distinguished Guest at *Universidad Nacional de Trujillo*, in occasion of the *V Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2004)* (15-18 Diciembre, 2004).
- Special Merit Academic Award by Universidad de Concepción, Concepción - Chile: January 2016 - December 2018; January 2013 - December 2015; March 2007 - December 2009; March 2005 - February 2007; March 2001 - February 2005.

#### EDITORIAL RESPONSABILITY:

Associate Member of the Editorial Board for:

- *Journal of Optimization Theory and Applications* (WoS/ISI Journal, Springer-Verlag Publications) since January 2011.  
<http://www.springer.com/mathematics/journal/10957>
- *Optimization* (WoS/ISI Journal, Taylor & Francis Ltd. United Kingdom) since January 2006.  
<http://www.tandf.co.uk/journals/titles/02331934.asp>
- *TOP, An Official Journal of the Spanish Society of Statistics and Operations Research* (WoS/ISI Journal, Springer Publications) since January 2017.  
<http://www.springer.com/business+%26+management/operations+research/journal/11750>
- *Minimax Theory and its Applications* (WoS/ISI Journal, Heldermann Verlag) since February 2014.  
<http://www.heldermann.de/MTA/mtacover.htm>
- *Communications in Optimization Theory* (COT) (Mathematical Research Press, London, UK) since April 2012.  
<http://cot.mathres.org>
- *Journal of Nonlinear and Variational Analysis* (JNVA) (Biemdas Academic Publishers Inc., Alberta, Canada) since December 2016.  
<http://jnva.biemdas.com>
- *International Journal of Optimization: Theory, Methods and Applications* (IJOTMA) (Global Information Publisher, GIP) since January 2009.  
<http://www.gip.hk/ijotma/>
- *Notas de Matemática*, a publication of the Sociedad de Matemática de Chile, January 2001 - December 2005.

#### SCHOLARSHIPS/FELLOWSHIPS/GRANTS

National Council of Sciences and Technology (Consejo Nacional de Ciencia y Tecnología), Lima - Perú:

- National Merit Scholarship (08/1987 to 09/1988)

International Centre for Theoretical Physics (ICTP), Trieste - Italy:

- Study Grant at SISSA/ISAS (10/1988 to 10/1992)

- Fellowships: August 16 - September 09, 1988.  
September 02 - October 01, 1993.  
October 21 - December 13, 1996.  
April 21 - May 09, 1997.  
August 27 - September 26, 1998: as Regular associate.  
August 19 - September 03, 2000: as Regular associate.  
July 17 - August 31, 2001: as Regular associate.  
July 30 - September 10, 2002: as Regular associate.  
July 10 - August 21, 2003: as Regular associate.  
September 09 - October 14, 2004: as Regular associate.  
July 27 - September 11, 2005: as Regular associate.  
August 28 - September 07, 2010: as Regular associate.
- Regular Associate Member: January 1998 - December 2005.  
January 2009 - December 2014.

International School for Advanced Studies (ISAS/SISSA), Trieste - Italy:

- Fellowships: December 05, 1994 - February 28, 1995.  
June 22 - June 28, 1996.  
August 06 - August 15, 1998.  
January 07 - February 06, 2002.

International Mathematical Union (IMU):

- Grant (for senior mathematicians, above 35 years old) to attend the International Congress of Mathematicians, Hyderabad-India, August 19-27, 2010.
- Grant (for senior mathematicians, above 35 years old) to attend the International Congress of Mathematicians, Madrid-Spain, August 22-30, 2006.
- Grant (for senior mathematicians, above 35 years old) to attend the International Congress of Mathematicians, Beijing-China, August 20-28, 2002.
- Grant (for young mathematicians, below 35 years old) to attend the International Congress of Mathematicians, T.U., Berlin-Germany, August 18-27, 1998.
- Grant (for young mathematicians, below 35 years old) to attend the International Congress of Mathematicians, E.T.H., Zürich-Switzerland, August 03-11, 1994.
- Grant awarded from the Commission on Development and Exchanges (October 1996; October 2004).

Swiss Federal Institute of Technology:

- Grant from the Organizing Committee of the *International Symposium on Mathematical Programming*, Lausanne-Switzerland, August 1997.

CONTRIBUTIONS AT INTERNATIONAL MEETINGS

- \* “Radially Symmetric Solutions for a Class of Non-convex Problems in the Calculus of Variations”, presented at *1st European Conference on Elliptic and Parabolic Problems* Pont-à-Mousson France, June 17-21, 1991.
- \* “Radial Solutions for some Classes of Non-convex Problems in the Calculus of Variations”, presented at *International Conference of Differential Equations EQUADIFF’91*, Barcelona-Spain, August 26-31, 1991.

- \* “The Lack of Lower Semicontinuity in the Calculus of Variations”, presented at *First Chilean-CEE School on Optimization and Third Franco-Latinoamerican Conference in Applied Mathematics*, Santiago-Chile, August 1992.
- \* “Applications of a duality theory in non-convex optimization”, Invited conference at *Seminario en Optimización Matemática*, Universidad Nacional de Ingeniería, Lima-Perú, July 5-9, 1993.
- \* “Duality in non-convex optimization”(in Spanish), Invited minicourse (a series of three lectures) delivered in occasion of the *III Congreso de Matemática Capricornio (COMCA)*, Antofagasta-Chile, August 4-7, 1993.
- \* “El rol de la convexidad en elasticidad finita”, Invited conference delivered in occasion of the *VII Coloquio Peruano de Física Matemática*, Lima-Perú, August 1993.
- \* “A constructive method for selections from the subdifferential of a convex function” (In Spanish), Invited conference delivered in occasion of the *IV Encuentro de Matemáticas y sus Aplicaciones*, Facultad de Ciencias, Escuela Politécnica Nacional (EPN), Quito-Ecuador, July 04-08, 1994.
- \* “ $C^1$ -selections from the subdifferential of a convex function”, presented at *International Congress of Mathematicians(ICM1994)*, E.T.H. Zürich-Switzerland, August 3-11, 1994.
- \* “Existence and non-existence in the Calculus of Variations” (In Spanish), Plenary conference delivered in occasion of the *LXVI Encuentro Nacional de la Sociedad de Matemática de Chile*, Valparaíso-Chile, October 28-29, 1994.
- \* “An Introduction to the Calculus of Variations” (In Spanish), Invited minicourse (a serie of three lectures) delivered in occasion of the *IX Jornadas de Matemática de la Zona Sur*, Chillán-Chile, April 26-28, 1995.
- \* “Some Non-convex symmetric problems in the Calculus of Variations”, Invited conference delivered at *2do. Seminario en Matemática Aplicada y Optimización*, Facultad de Ciencias, Universidad Nacional de Ingeniería, Lima-Perú, October 02-05, 1995.
- \* “Subdifferentiability with respect to the continuous functions”, Invited conference delivered at *2das. Jornadas Catalanas de Matemática Aplicada*, Four Solaise, Font Romeu-Odeillo, France, November 29 - December 01, 1995.
- \* “Simplified Global Optimality Conditions for Differences of Phi-convex Functions”(with J.E. Martinez-Legaz), talk delivered at *V Symposium on Generalized Convexity and its Applications*, CIRM-Luminy, Marseille-France, June 17-21, 1996.
- \* “Some remarks on the Ekeland variational principle” (In Spanish), Invited conference delivered in occasion of the *V Encuentro de Matemáticas y sus Aplicaciones*, Facultad de Ciencias, Escuela Politécnica Nacional (EPN), Quito-Ecuador, July 22-26, 1996.
- \* “Una Introducción al Cálculo de Variaciones y aplicaciones en Elasticidad Finita”, Invited minicourse (a series of three lectures) delivered in occasion of the *Seminario Nacional de Aplicaciones de la Matemática*, Facultad de Ciencias Naturales y Formales, Universidad Nacional de San Agustín, Arequipa-Perú, October 14-18, 1996.

- \* “An attempt to define the conjugate of set-valued maps and related properties”, Invited talk delivered within the cluster session (also Chairman) *Generalized convexity at XVI International Symposium on Mathematical Programming*, EPFL, Lausanne-Switzerland, August 24-29, 1997.
- \* “Minimizing integral functionals via Lyapunov-type theorems”, Invited minicourse (a series of three lectures) delivered at *3er. Seminario Internacional en Matemática Aplicada y Optimización*, Facultad de Ciencias, Universidad Nacional de Ingeniería, Lima-Perú, October 06-10, 1997.
- \* “Un resultado del tipo Lyapunov en Cálculo de Variaciones” (with V. Briceño), talk delivered in occasion of the *LXIX Encuentro Nacional de la Sociedad de Matemática de Chile*, Olmué-Chile, October 24-25, 1997.
- \* “A variational problem in Mathematical Economics”, Invited conference delivered in occasion of the *Inauguration* of the *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima-Perú, December 08-12, 1997.
- \* “Optimal solutions to some variational problems in Consumer theory” (In Spanish), Invited conference delivered in occasion of the *VI Encuentro de Matemáticas y sus Aplicaciones y Cuarta Escuela Andina de Ecuaciones Diferenciales*, Facultad de Ciencias, Escuela Politécnica Nacional (EPN), Quito-Ecuador, July 06-10, 1998.
- \* “Optimal solutions to some variational problems arising in Economics”, presented at *International Congress of Mathematicians* (ICM1998), T.U. Berlin, Berlin-Germany, August 18-27, 1998.
- \* “Optimal planning to variational problems arising in Economics”, Invited talk delivered in occasion of the *5ème Congrès Franco-Latinoaméricain de Mathématiques Appliquées*, Universidad de Chile, Departamento de Ingeniería Matemática, Santiago-Chile, December 15-18, 1998.
- \* Chairman of the special session “Optimization and Calculus of Variations” and Invited conference “Pseudomonotone equilibrium problems and calculus of variations” delivered in occasion of the *IX Congreso de Matemática Capricornio (COMCA)*, Antofagasta-Chile, August 04-07, 1999.
- \* “Simplified optimality conditions for a difference of vector-valued functions”, Contributed talk at (also Chairman) *VI International Symposium on Generalized Convexity/Monotonicity*, Karlovassi, Samos-Greece, August 30-September 3, 1999.
- \* “Noncoercive generalized equilibrium problems: the quasiconvex case”, Invited conference delivered at *4to. Seminario Internacional en Matemática Aplicada y Optimización*, Facultad de Ciencias, Universidad Nacional de Ingeniería, Lima-Perú, October 04-08, 1999.
- \* “The conjugate of set-valued maps and related properties”, Invited conference delivered at *4to. Seminario Internacional en Matemática Aplicada y Optimización*, Facultad de Ciencias, Universidad Nacional de Ingeniería, Lima-Perú, October 04-08, 1999.

- \* “Non-coercive vector equilibrium problems: existence of solutions”, Contributed talk at *French-German-Italian Conference on Optimization*, Université Montpellier II, Montpellier-France, September 04-08, 2000.
- \* “A unified approach in optimization theory” (In Spanish), Invited conference delivered in occasion of the *LXXII Encuentro Nacional de la Sociedad de Matemática de Chile*, Punta de Talca-Chile, October 26-28, 2000.
- \* “The equilibrium problem and variational problems”, Invited lectures (two) delivered at the *Summer School*, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, Concepción-Chile, January 08-19, 2001.
- \* “Two variational problems in consumption theory”, Invited talk delivered in occasion of the *XV Jornadas de Matemática de la Zona Sur*, Universidad de Concepción, Concepción-Chile, April 26-28, 2001.
- \* “Existence in convex vector optimization problems and optimality conditions in non-convex set-valued minimization” Contributed lecture at *XXXIV Workshop on Optimization and Control with Applications*, Erice-Italy, July 09-17, 2001.
- \* “A unifying approach in optimization theory and applications”, Invited lecture delivered at *Tenth International Colloquium on Numerical Analysis and Computer Science with Applications*, Plovdiv-Bulgaria, August 12-17, 2001.
- \* “Variational problems in mathematical economics”, Plenary Conference delivered at *XIX Coloquio Nacional de Matemática*, Universidad Nacional de Trujillo, Trujillo-Perú, November 05-10, 2001.
- \* “Existence theory for finite dimensional equilibrium problems”, Invited mini-course (two lectures) delivered at *XIX Coloquio Nacional de Matemática*, Universidad Nacional de Trujillo, Trujillo-Perú, November 05-10, 2001.
- \* “Radial epiderivatives and recession functions in non-convex vector optimization”, Invited talk delivered in occasion of the *6ème Congrès Franco-Latinoaméricain de Mathématiques Appliquées*, Universidad de Chile, Center for Mathematical Modeling, Santiago-Chile, December 17-21, 2001.
- \* “Vector optimization problems: existence of solutions and optimality conditions”, Plenary Conference delivered in occasion of the *XVI Jornadas de Matemática de la Zona Sur*, Universidad Católica del Maule, Talca-Chile, April 26-28, 2002.
- \* “Characterizations of the existence of solutions for a class of non-convex vector optimization problems”, Invited lecture delivered at *International Conference on Optimization and Optimal Control*, Mongolian State University and Center of Science and Culture of the Mongolian Academy of Sciences, Ulaanbaatar-Mongolia, August 13-17, 2002.
- \* “Characterizations of the non-emptiness/compactness of the solution set to equilibrium problems”, presented at *International Congress of Mathematicians (ICM2002)*, Beijing International Convention Center, Beijing-China, August 20-28, 2002.

- \* “On a class of non-convex vector optimization problems”, Invited lecture delivered at *International Symposium of Mathematics* within the Special Session on *Optimization and Calculus of Variations*, Universidad de Magallanes, Punta Arenas-Chile, November 12-15, 2002.
- \* (with D. Carrasco) “Representation of the  $\varepsilon$ -subdifferential for a class of non-convex / convex functions”, Invited lecture delivered at *International Symposium of Mathematics* within the Special Session on *Optimization and Calculus of Variations*, Universidad de Magallanes, Punta Arenas-Chile, November 12-15, 2002.
- \* “Radial epiderivatives and optimality conditions in non-convex scalar/vector optimization”, Plenary conference delivered at *6to. Seminario Internacional en Matemática Aplicada y Optimización*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima-Perú, October 06-10, 2003.
- \* “On a non-convex variational problem of the Laplacian” talk delivered in occasion of the *LXXV Encuentro Nacional de la Sociedad de Matemática de Chile* within the Special Session *Optimization*, Vicuña-Chile, 30-31 October and 1st November, 2003.
- \* (with C. Vera) “An optimal 2D alternative theorem and nonconvex optimization problems”, presented at *V Brazilian Workshop on continuous optimization*, Florianopolis-Brasil, March 22-25, 2004.
- \* (with R. López) “Asymptotic analysis, existence and sensitivity results for linear complementarity problems”, Contributed lecture at *12th French-German-Spanish Conference on Optimization*, Université de Avignon, Avignon-France, September 20-24, 2004.
- \* (with C. Vera) “Computing the weakly Pareto minima for bicriteria quasiconvex mappings on the real-line without derivative” talk delivered in occasion of the *LXXVI Encuentro Nacional de la Sociedad de Matemática de Chile* within the Special Session *Optimization*, Olmué-Chile, 28-30 October, 2004.
- \* “A basic theory of multivalued complementarity problems”, Plenary Conference at *V Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2004)* (15-18 December, 2004), Universidad Nacional de Trujillo, Trujillo - Perú.
- \* “Is it really a drawback the convexity in optimization ?”, talk delivered in occasion of the *6ème Congrès Franco-Latinoaméricain de Mathématiques Appliquées*, Universidad de Chile, Center for Mathematical Modeling, Santiago-Chile, January 14-18, 2005.
- \* “Weak efficiency in convex and quasiconvex vector minimization”, Plenary conference delivered at *VII Seminario Internacional en Matemática Aplicada y Optimización*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima-Perú, October 03-07, 2005.
- \* “Weak efficiency in multiobjective quasiconvex minimization”, Plenary Conference delivered at *III Congreso Internacional de Matemática Aplicada y Computacional (CIMAC III)*, Universidad Nacional del Callao, Facultad de Ciencias Naturales y Matemática, Callao-Perú, January 30 - February 04, 2006.



- \* “Asymptotic analysis for equilibrium and multivalued complementarity problems beyond copositivity and positive homogeneity”, contributed lecture delivered at *VIEW's on Differential Equations (VIEW's 2006)*, Universidad de Aveiro, Departamento de Matemática Aplicada, Aveiro-Portugal, 21 - 24 June, 2006.
- \* “Asymptotically bounded multifunctions and the MCP beyond copositivity and positive homogeneity”, presented at *International Congress of Mathematicians (ICM2006)*, Palacio Municipal de Congresos, Madrid-Spain, August 22-30, 2006.
- \* “Asymptotically bounded multifunctions and the multivalued complementarity problem”, Invited conference delivered in occasion of the *Inauguration* of the Building of the *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima-Perú, December 04-09, 2006.
- \* “Weak efficiency in convex and quasiconvex vector optimization problems”, invited talk within the Stream session “Vector and Set-valued Optimization” at *22nd European Conference on Operational Research (EURO XXII 2007)*, University of Economics, Prague-Czech Republic, 08 - 11 July, 2007.
- \* “Characterizing efficiency without linear structure”, invited conference delivered in *VIII Seminario Internacional en Matematica Aplicada y Optimización*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima-Perú, 01-05 October, 2007.
- \* “Multivalued complementarity problems with asymptotically bounded multifunctions”, invited talk at *VI Journées Franco-Chiliennes d'Optimisation*, Université Sud Toulon-Var, Toulon-France, May 19-21, 2008.
- \* “An optimal alternative theorem and quasiconvex multiobjective optimization”, Plenary Conference at *XI Encuentro de Matemática y sus Aplicaciones*, Escuela Politécnica Nacional, Quito-Ecuador, July 07-11, 2008.
- \* “Overview on generalized convexity and vector optimization”, Lecturer of two sessions at (also Chairman) *2nd Summer School on Generalized Convex Analysis: Introduction to Theory and Applications*, Department of Applied Mathematics, National Sun Yat-sen University, Kaohsiung-Taiwan, July 15-19, 2008.
- \* “Asymptotically bounded multivalued complementarity problems”, Contributed talk at (also Chairman) *IX International Symposium on Generalized Convexity/Monotonicity*, Department of Applied Mathematics, National Sun Yat-sen University, Kaohsiung-Taiwan, July 21-25, 2008.
- \* “Convexity behind the non-convexity in optimization”, Plenary Conference at *IV International Congress of Computational and Applied Mathematics*, Facultad de Ciencias Físicas y Matemáticas, Universidad Nacional Pedro Ruiz Gallo, Lambayeque-Perú, September 15-19, 2008.
- \* “Convexity behind the nonconvexity in Optimization”, invited talk at *Workshop on Variational Analysis*, Departamento de Ingeniería Matemática - CMM, Universidad de Chile, Santiago-Chile, November 10-13, 2008.

- \* “Scalarizing and unifying (approximate) efficiency: a basic theory and optimality conditions”, Keynote Speaker at *The 2nd International Conference of Nonlinear Analysis and Optimization (NAOP2009)*, Department of Mathematics, University of Isfahan, Isfahan - Iran, May 13-15, 2009.
- \* “Hidden convexity in nonconvex optimization”, Invited Conference at *VI Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2009)*, Escuela Politecnica Nacional (EPN), Quito - Ecuador, 14-18 September, 2009.
- \* “Unifying vector optimization problems: a theoretical approach and optimality conditions”, invited conference delivered in *IX International Seminar on Optimization and Related Areas*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 05-09 October, 2009.
- \* “Are we really far from convexity in nonconvex optimization ?”, invited speaker delivered in *International Conference on Optimization and Its Applications*, Department of Mathematics, Banaras Hindu University (BHU), Varanasi - India, 16-18 February, 2010.
- \* “A unification of vector optimization problems: complete scalarization and optimality conditions”, invited talk delivered in *24th Mini EURO Conference on Continuous Optimization and Information-Based Technologies in the Financial Sector*, MEC-EurOPT-2010, Izmir University of Economics, Izmir - Turkey, 23-26 June, 2010.
- \* “Equivalent formulations to Gordan alternative theorems and its uses in vector optimization”, invited talk at *The International Conference on Continuous Optimization (ICCOPT) 2010*, Universidad de Chile, Santiago, Chile July 26-29, 2010.
- \* “Characterizing the Lagrangian strong duality in constrained nonconvex optimization”, presented at *International Congress of Mathematicians (ICM2010)*, Hyderabad International Convention Centre (HIIC), Hyderabad-India, August 19-27, 2010.
- \* “Convexity is not far from non-convexity in optimization”, invited talk at *Arrigo Cellina’s 70th birthday, Nonlinear differential equations and control*, Dipartimento de Matematica e Applicazioni, Università di Milano-Bicocca, Milano-Italy, September 22-23, 2011.
- \* “Strong duality in cone-constrained nonconvex optimization with applications to non-convex variational problems”, invited plenary session at *International conference, Optimization, Theory, Algorithms and Applications in Economics*, A tribute to Juan Enrique Martinez-Legaz on his 60th birthday, Centre de Recerca Matemàtica (CRM), Barcelona-Spain, October 24-28, 2011.
- \* “Existence and strong duality for a class of non-convex variational problems”, Invited talk at *IX Americas Conference on Differential Equations*, Universidad Nacional de Trujillo, Trujillo - Perú, January 09-14, 2012.
- \* “Existence and strong duality for a class of nonconvex variational problems”, Invited talk at Stream Session on “Optimization and Calculus of Variations” *XXV Jornadas de Matemática de la Zona Sur*, Concepción-Chile, April 18-20, 2012.

- \* “Scalarizing vector optimization problems with non-necessarily transitive preferences or solid cones” Invited talk and also chairman at *International Mini-Conference on Set-Valued Variational Analysis and Optimization with Applications in Finance*, Leucorea, Lutherstadt Wittenberg - Germany, August 16-19, 2012.
- \* “Efficiency and ordering variational principles”, Invited talk delivered within the cluster session *Muti-objective optimization* at *XXI International Symposium on Mathematical Programming*, BTU, Berlin-Germany, August 19-24, 2012.
- \* “Characterization of efficiency via scalarization with ordering sets without solidness” within the Sesion “*Efficiency and vector optimization with applications*” at *26nd European Conference on Operational Research (EURO XXVI 2013)*, University La Sapienza Tor Vergata, Rome-Italy, 01 - 04 July, 2013.
- \* “Characterizing strong duality in nonconvex (quadratic) programming”, Invited conference delivered at *XI International Seminar on Optimization and Related Areas*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 07-11 October, 2013.
- \* “Characterizing FJ and KKT points in nonconvex optimization with applications to a class of MPEC’s”, Invited conference delivered at *2nd International Conference on Variational Analysis and Optimization*, CMM, Universidad de Chile, Santiago - Chile, 07-10 January, 2014.
- \* “Does convexity arise in optimization naturally?”, Invited conference delivered at *Workshop about variational inequalities, equilibria and neighbouring problems*, Dipartimento di Informatica, Università di Pisa, Italy, 29-30 May, 2014.
- \* “Convexity of the value function for a class of nonconvex variational problems: existence and optimality conditions” Invited conference delivered at *IV LatinAmerican Workshop on Optimization and Control*, IMCA-UP, Lima, Perú, 15-18 July, 2014.
- \* “Hidden convexity in nonconvex optimization”, Contributed talk at *XI International Symposium on Generalized Convexity/Monotonicity*, IMPA, Rio de Janeiro-Brazil, August 25-30, 2014.
- \* “Geometric and topological characterization of strong duality in nonconvex optimization”, Plenary conference at *International Conference on Variational Analysis, Optimization and Quantitative Finance* (honoring Terry Rockafellar’s 80th birthday, University of Limoges, Limoges-Francia, May 18-22, 2015.
- \* “Searching convexity in nonconvex optimization”, Plenary conference delivered in occasion of the *XXIV Congreso de Matemática Capricornio (COMCA)*, Campus Playa Brava, Universidad Arturo Prat, Iquique-Chile, August 05-07, 2015.
- \* “Joint-range convexity for a pair of inhomogeneous quadratic functions with applications”, Plenary conference delivered in *XII International Seminar on Optimization and Related Areas*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 05-09 October, 2015.

- \* “Local optimality implies global for a class of nonconvex integrals - Convexity of the image for a pair of quadratic functions”, Invited speaker in *Recent trends in differential equations: an international conference to celebrate the 75th birthday of Arrigo Cellina and 60th birthday of Alberto Bressan*, Universidad de Aveiro, Departamento de Matemática Aplicada, Aveiro-Portugal, 27 - 29 June, 2016.
- \* “The standard quadratic optimization problem beyond the polyhedral case reveals hidden convexity”, Plenary Conference at *VIII International Congress of Computational and Applied Mathematics*, Facultad de Ciencias, Universidad Nacional de Ingeniería, Lima-Perú, August 23 - 26, 2016.
- \* “The conjugate of one-dimensional set-valued maps and related properties”, Invited speaker in *Third International Conference on Set-Valued Variational Analysis and Set Optimization with Applications to Economics, Finance, Statistics and Game Theory*, Vienna University of Economics and Business, Vienna - Austria, 19 - 23 September, 2016.
- \* “Convexity: can we avoid it?”, Plenary conference delivered in occasion of the *XXX Jornadas de Matemática de la Zona Sur*, Campus San Andrés, Universidad Católica de la Santísima Concepción, Concepción-Chile, April 26-28, 2017.
- \* “The standard quadratic optimization problem and its extensions: strong duality, hidden convexity and S-lemma”, Contributed talk at *XII International Symposium on Generalized Convexity/Monotonicity*, Hajdúszoboszló - Hungary, August 27-September 02, 2017.
- \* “Convexity behind strong duality for a class of nonconvex quadratic optimization problems”, Invited conference delivered in *XIII International Seminar on Optimization and Related Areas*, Instituto de Matemática y Ciencias Afines (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 09 - 13 October, 2017.
- \* “Nonconvex integrals in  $L^1$ : strong duality, existence and local/global optimality”, Invited conference delivered in *International Workshop on Optimization and Variational Analysis*, Termas de Cauquenes, Universidad de O’ Higgins, Rancagua - Chile, 10 - 11 January, 2018.
- \* “A zero-scale asymptotic analysis for quasiconvex functions and related properties”, Contributed talk at *International Conference on Variational Analysis and Nonsmooth Optimization*, Martin-Luther Universität Halle-Wittenberg, Halle (Saale) - Germany, 28 June - 01 July, 2018.
- \* “Optimizando durante toda la vida”, Plenary conference delivered in occasion of the *XXVII Congreso de Matemática Capricornio (COMCA)*, Campus Coloso, Universidad de Antofagasta, Antofagasta-Chile, July 25 - 27, 2018.
- \* “Quasiconvex optimization under zero-scale asymptotic analysis”, Contributed talk delivered in occasion of the *XXVII Congreso de Matemática Capricornio (COMCA)*, Campus Coloso, Universidad de Antofagasta, Antofagasta-Chile, July 25 - 27, 2018.
- \* “The quadratic world and convexity with applications in nonconvex optimization”, Plenary Conference at *IX International Congress of Computational and Applied Mathematics*, Facultad de Ciencias, Universidad Nacional Agraria La Molina, Lima-Perú, August 06 - 09, 2019.

- \* “A new notion of asymptotic function in quasiconvex optimization with applications to quadratic programming”, Contributed talk at Miniworkshop on “Optimizaci3n: herramientas te3ricas y algoritmos” *IX International Congress of Computational and Applied Mathematics*, Facultad de Ciencias, Universidad Nacional Agraria La Molina, Lima-Per3, August 06 - 09, 2019.
- \* “Simultaneous diagonalization under weak regularity and a characterization”, Invited conference delivered in *XIV International Seminar on Optimization and Related Areas*, Instituto de Matem3tica y Ciencias Afines (IMCA), Universidad Nacional de Ingenier3a, Lima - Per3, 07 - 11 October, 2019.

### INVITED TALKS AT SCIENTIFIC INSTITUTIONS

- \* “Radially symmetric solutions for a class of nonconvex problems in the Calculus of Variations”, talk delivered at SISSA, Trieste-Italy, March 13, 1991.
- \* “Resultados de Existencia y no existencia en C3lculo de Variaciones”, invited minicourse (a series of three lectures) delivered at Universidad de Santiago de Chile, Facultad de Ciencias, Departamento de Matem3ticas y Ciencias de la Computaci3n, Santiago-Chile, September 1992.
- \* “Una teor3a de Dualidad no convexa”, invited conference delivered at Facultad de Ciencias F3sicas y Matem3ticas, Universidad Nacional de La Libertad, Trujillo-Per3, Febrero 1993.
- \* “Algunos t3picos en Ecuaciones Diferenciales Ordinarias, Sistemas Din3micos y C3lculo de Variaciones”, invited minicourse (a series of five lectures) delivered at Universidad Nacional de Piura, Piura-Per3, Abril 1993.
- \* “Algunas reflexiones sobre el problema de minimizaci3n en el C3lculo de Variaciones”, invited talk delivered at Universidad Cat3lica de la Sant3sima Concepci3n, Concepci3n-Chile, Julio 1994.
- \* “Lower perturbations for some classes of non-convex integrals”, invited talk delivered at SISSA, Trieste-Italy, January 10, 1995.
- \* “Sul problema di non esistenza di minimo per una classe di funzionali con integrando non-convesso”, invited talk delivered at Dipartimento di Matematica Pura ed Applicata, Universit3 di Padova, Padova-Italy, February 01, 1995.
- \* “El Teorema de Liapunov: Variantes y Aplicaciones”, invited talk delivered at Departamento de Ingenier3a Matem3tica, Facultad de Ciencias F3sicas y Matem3ticas, Universidad de Chile, Santiago-Chile, October 25, 1995.
- \* “Non-convex integrands in the Calculus of Variations”, invited minicourse (a series of three lectures) delivered at Departament de Matem3tica Aplicada i An3lisi, Universidad de Barcelona, Barcelona-Spain, November 22-24, 1995.
- \* “Algunas reflexiones en el C3lculo de Variaciones”, talk delivered within the *Colloquium* of the Departamento de Ingenier3a Matem3tica, Universidad de Concepci3n, Concepci3n-Chile, May 08, 1996.

- \* “Remarks on the Ekeland variational principle and related properties”, invited talk delivered at SISSA, Trieste-Italy, June 26, 1996.
- \* “Aproximación numérica en el Cálculo de Variaciones”, invited talk delivered at Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI), Lima-Perú, July 19, 1996.
- \* “De la geometría de los espacios de Banach a la teoría de optimización”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, May 14, 1997.
- \* “Un problema variacional en teoría del consumidor”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, November 12, 1997.
- \* “Optimización y Cálculo de Variaciones sin convexidad: una introducción”, invited course delivered at the *Instituto de Matemática y Ciencias Afines* (IMCA), Lima-Perú, January 04 - 29, 1999.
- \* “Problemas de minimización no-coercivos”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, June 28, 2000.
- \* “Existence in scalar/vector convex optimization and optimality conditions in non-convex set-valued minimization”, invited lecture delivered at *Centre for Mathematical Modeling*, Universidad de Chile, Santiago-Chile, July 05, 2000.
- \* “Non-coercive problems in optimization: theory and application”, invited talk delivered at *Centre for Mathematical Modeling*, Universidad de Chile, Santiago-Chile, November 27, 2000.
- \* “An existence theory for equilibrium problems”, invited talk delivered at SISSA, Trieste-Italy, January 23, 2002.
- \* “Recession analysis and minimization problems”, invited talk delivered at Department of Mathematics, Aligarh Muslim University, Aligarh-India, February 08, 2002.
- \* “An introduction to the Calculus of Variations”, invited talk delivered at Department of Mathematics, Aligarh Muslim University, Aligarh-India, February 09, 2002.
- \* “Star-shaped vector functions and non-convex vector optimization”, invited talk delivered at *Centre for Mathematical Modeling*, Universidad de Chile, Santiago-Chile, May 29, 2002.
- \* “Variational problems arising in mathematical economics”, invited talk delivered at *Departamento de Matemática*, Universidad de Aveiro, Aveiro-Portugal, April 23, 2003.
- \* “The vector Weierstrass theorem and generalized quasiconvex vector optimization”, invited talk delivered at *Dipartimento di Statistica*, Università degli Studi di Milano-Bicocca, Milan-Italia, July 17, 2003.
- \* “Existence theory for non-coercive pseudomonotone equilibrium problems”, invited talk delivered at *Dipartimento di Sistemi ed Istituzioni per l'Economia*, Università degli Studi di L'Aquila, L'Aquila-Italia, July 21, 2003.

- \* “An overview of vector optimization and game theory”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, 1st October, 2003.
- \* “Un problema variacional dependiente del Laplaciano y análisis numérico”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, June 23, 2004.
- \* “De la Optimización a la Teoría de Juegos”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, September 28, 2005.
- \* “De la Optimización a la Teoría de Juegos Nocooperativos: un recuento interesante”, conference delivered within the *Ceremonia de Incorporación*, Academia Nacional de Ciencia y Tecnología (ANCyt), Lima-Perú, October 06, 2005.
- \* “Weak efficiency in convex and quasiconvex vector minimization: existence and optimality conditions”, a series of four invited lectures delivered at *Departamento de Matemática Aplicada I*, Escuela Técnica Superior de Ingeniería Industriales, Universidad Nacional de Educación a Distancia, Madrid-Spain, 07, 08, 14, 15 November, 2005.
- \* “A unified approach for linear complementarity problems”, invited talk delivered at *Departamento de Matemática Aplicada I*, Escuela Técnica Superior de Ingeniería Industriales, Universidad Nacional de Educación a Distancia, Madrid-Spain, 19 June, 2006.
- \* “A general existence theory and sensibility for multivalued complementarity problems”, invited talk delivered at *Departamento de Matemática Aplicada I*, Escuela Técnica Superior de Ingeniería Industriales, Universidad Nacional de Educación a Distancia, Madrid-Spain, 16 Julio, 2007.
- \* “Efficiency and weak efficiency in vectorial optimization”, invited talk at *Area Ciencias Básicas*, Facultad de Ingeniería, Universidad Católica de la Santísima Concepción, Concepción-Chile, 16 Octubre, 2007.
- \* “Asymptotically bounded multifunctions and MCP beyond copositivity”, invited seminar at *Analyse Nonlineaire et Optimisation Seminaire*, Département de Mathématique, Université d’Avignon, Avignon-France, 22 May, 2008.
- \* “Optimization multiobjetivo y convexidad escondida”, talk delivered within the *Colloquium* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, August 20, 2008.
- \* “An alternative theorem and applications in mathematical optimization”, invited talk delivered at Departamento Académico de Matemática, Universidad Nacional de Trujillo, Trujillo-Perú, October 12, 2009.
- \* “Gordan-type alternative theorems with applications in mathematical programming” and “A general class of vector functions with aplicaciones in vector optimization”, two invited lectures within the TRAINING-PROGRAMME-2010 on “Optimization theory and applications” at Departament of Mathematics, Faculty of Mathematical Sciences, University of Delhi (UD), Delhi-India, 10-14 February, 2010.

- \* “Characterizing the Lagrangian strong duality in constrained nonconvex optimization”, talk delivered within the *Winter School* of the Departamento de Ingeniería Matemática, Universidad de Concepción, Concepción-Chile, September 30, 2010.
- \* “The Lagrangian strong duality and nonconvex constrained optimization”, 27 December, 2010; “Variable preference relations and theory of change”, 30 December 2010, invited talks delivered at Departamento Académico de Matemática, Universidad Nacional de Trujillo, Trujillo-Perú.
- \* “Nonlinear complementarity problems with asymptotically bounded multifunctions: existence and sensitivity results”, invited talk delivered at Dipartimento di Matematica, Università di Pisa, Pisa-Italy., 01 June, 2011.
- \* “The role of convexity in nonconvex optimization: from mathematical programming to calculus of variations”, invited talk delivered at *Departamento de Matemática Aplicada I*, Escuela Técnica Superior de Ingeniería Industriales, Universidad Nacional de Educación a Distancia, Madrid-Spain, 21 October, 2011.
- \* “An alternative-type formulation of the Fritz John/KKT optimality conditions”, invited talk delivered at Departamento Académico de Matemática, Universidad Nacional de Trujillo, Trujillo-Perú, 24 September, 2012.
- \* “A geometric characterization of strong duality in nonconvex quadratic programming”, invited talk delivered at Dipartimento di Informatica, Università di Pisa, Pisa-Italy, 03 December, 2012.
- \* “Las condiciones de Fritz John, KKT y la propiedad de dualidad fuerte en optimización no convexa”, invited talk delivered at Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI), Lima-Perú, 10 May, 2013.
- \* “The two-dimensional world in (nonconvex) multiobjective programming”, invited talk delivered at Dipartimento di Informatica, Università di Pisa, Pisa-Italy, 25 June, 2013.
- \* “Unifying efficiency and weak efficiency in vector optimization”, invited talk delivered at Dipartimento di Matematica, Università di Genova, Genova-Italy, 05 June, 2014.
- \* “Cuando la convexidad en optimización surge de modo natural”, invited talk delivered at Departamento Académico de Matemática, Universidad Nacional de Trujillo, Trujillo-Perú, July 22, 2014.
- \* Series of ten lectures (two hours each), as a short course, entitled “Vector Optimization”, delivered at Departamento de Gestión y Control de la Facultad de Economía y Negocios de la Universidad de Chile, Santiago-Chile, January 14 - 16; 21 - 23, 2015.
- \* “Strong duality in nonconvex optimization with a single equality and geometric constraints: applications to QP”, invited talk delivered at Dipartimento di Informatica, Università di Pisa, Pisa-Italy, 30 June, 2015.
- \* “A unifying model in vector optimization theory”, invited talk delivered at *Departamento de Matemática Aplicada I*, Escuela Técnica Superior de Ingeniería Industriales, Universidad Nacional de Educación a Distancia, Madrid-Spain, 09 July, 2015.



- \* “Lagrangian duality without standard convexity”, Series of five lectures (three hours each) delivered at *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 04 - 10 February, 2016.
- \* “Introduction to Calculus of Variations”, Series of five lectures (three hours each) delivered at *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 13 - 19 April, 2016.
- \* “A semi-infinite programming approach for the circular conic STQOP: strong duality, optimality and hidden convexity”, invited talk delivered at Dipartimento di Informatica, Università di Pisa, Pisa-Italy, 04 July, 2016.
- \* “Nonconvex quadratic optimization”, Series of five lectures (three hours each) delivered at *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 15 - 19 August, 2016.
- \* “Does convexity arise in optimization naturally?”, Invited talk delivered at *Center for Mathematical Modeling* (CMM), Universidad de Chile, Santiago, 16 November, 2016.
- \* “De la Optimización a la teoría de juegos no-cooperativos: un recuento interesante”, Invited conference delivered at *Facultad de Ciencias, Universidad Nacional de Ingeniería*, Lima - Perú, 05 February, 2018.
- \* “Convexity of images for quadratic-linear mappings and applications”, Invited talk delivered at *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 20 February, 2019.
- \* “The role of zero-scaled asymptotic functions in quasiconvex optimization”, Invited talk delivered at *Instituto de Matemática y Ciencias Afines* (IMCA), Universidad Nacional de Ingeniería, Lima - Perú, 26 April, 2019.

## INVITED VISITING RESEARCHER

International Centre for Theoretical Physics (ICTP), Trieste - Italy:

- October 02 - October 30, 1993.
- August 12 - August 18, 1994.
- October 21 - December 13, 1996.
- August 30 - September 06, 1997.
- August 27 - September 26, 1998: as an associate member.
- August 18 - August 24, 1999: as an associate member.
- August 19 - September 03, 2000: as an associate member.
- July 17 - August 31, 2001: as an associate member.
- July 30 - September 10, 2002: as an associate member.
- July 10 - August 21, 2003: as an associate member.
- September 09 - October 14, 2004: as an associate member.
- July 27 - September 11, 2005: as an associate member.
- August 28 - September 07, 2010: as an associate member.

International School for Advanced Studies (ISAS/SISSA), Trieste - Italy:

- December 05, 1994 - February 28, 1995.
- June 22 - June 28, 1996.
- August 06 - August 15, 1998.
- January 07 - February 06, 2002.

Universidad Aut3noma de Barcelona, Departament d'Economía i d'Hist3ria Econ3mica. Barcelona - Spain:

- November 20 - December 02, 1995.
- August 31 - September 10, 2006.

Laboratoire de Mathématiques pour l'Industrie et la Physique, U.F.R.-M.I.G. Université Paul Sabatier, Toulouse III, Toulouse - France:

- February 23 - March 22, 1998.

Université d'Avignon, D3partament de Math3matique, Avignon - France:

- May 22 - 24, 2008.

Université de Bourgogne, Institut de Math3matiques de Bourgogne, Dijon - France:

- October 27 - November 09, 2013.
- November 23 - December 06, 2014.
- July 02 - 15, 2017.

Instituto de Matemática y Ciencias Afines (IMCA), Lima-Perú:

- December 08 - 12, 1997.
- January 04 - 29, 1999.
- October 06 - 10, 2003.
- October 03 - 07, 2005.
- December 04 - 09, 2006.
- February 02 - 16, 2016.
- April 11 - 22, 2016.
- August 15 - 27, 2016.
- October 04 - 14, 2017.
- February 05 - 11, 2018.
- February 17 - 21, 2019.
- April 25 - May 04, 2019.

Centre for Mathematical Modeling (CMM), Universidad de Chile, Santiago - Chile:

- July 05 - 07, 2000.
- May, 2002.
- October, 2004.
- January 11 - 18, 2005.
- January 18 - 19, 2006.
- November 16 - 18, 2016.
- November 01 - 02, 2017.

Universidad Nacional de Trujillo, Facultad de Ciencias Físicas y Matemáticas, Departamento de Matemáticas, Trujillo - Perú:

- November, 2001.
- December, 2004.
- December, 27 - 30, 2010.

Aligarh Muslim University, Department of mathematics, Aligarh - India:

- February 07 - 11, 2002.

Universidade de Aveiro, Departamento de Matematica, Aveiro - Portugal:

- April 21 - 26, 2003.
- June 21 - 24, 2006.

University of Delhi, Department of mathematics, Faculty of Mathematical Science, Delhi - India:

- February 10 - 14, 2010.

Università di Padova, Dipartimento di Matematica Pura ed Applicata. Padova - Italy:

- January 31 - February 02, 1995.

Università degli Studi di Milano-Bicocca, Dipartimento di Statistica, Milan - Italy:

- July 17 - 18, 2003.

Università degli Studi di L'Aquila, Dipartimento di Sistemi ed Istituzioni per l'Economia, L'Aquila - Italy:

- July 19 - 23, 2003.

Università di Genova, Dipartimento di Matematica, Genova - Italy:

- June 02 - 06, 2014.

Università di Pisa, Dipartimento di Matematica, Pisa - Italy:

- May 31 - June 11, 2011.
- September 25 - 26, 2011.

Università di Pisa, Dipartimento di Informatica, Pisa - Italy:

- 26 November - 07 December, 2012.
- 18 - 28 June, 2013.
- 18 May - 01 June; 06 - 08 June, 2014.
- 27 June - 05 July, 2015.
- 30 June - 07 July, 2016.
- 16 - 27 June, 2018.
- 09 - 22 June, 2019.

Libera Università di Bolzano, Facoltà di Economia e Negozio, Faculty of Economics and Management, Brunico-Brunick - Italy:

- 26 -30 September, 2016.

Universidad Nacional de Educación a Distancia, Departamento de Matemática Aplicada I, Madrid - Spain:

- 02 November - 01 December, 2005.
- 18 - 20 June, 2006.
- 12 - 22 July, 2007.
- 19 - 22 June, 2010.
- 19 - 23 October, 2011.
- 06 - 10 July, 2015.

National Sun Yat-sen University, Department of Applied Mathematics, Kaohsiung - Taiwan:

- July 15 - 25, 2008.

University of Isfahan, Department of Mathematics, Isfahan - Iran:

- May 12 - 17, 2009.

Universidad Arturo Prat, Facultad de Ingeniería y Arquitectura, Iquique - Chile:

- January 08 - 09, 2018.

## RESEARCH GRANTS

Italian Project from “Libera Università di Bolzano”, School of Economics and Management, Italy:

- \* Co-researcher of the Project “An abstract convexity approach to scalarization in set/vector optimization and to multi-utility representation”. Responsible (in Italy) Andreas Hamel, UNIBZ, Italy (2015-2017).

Peruvian Project “Programa Nacional de Innovación para la Competitividad y Productividad, Perú”:

- \* Main researcher of the Project “Optimización no convexa: Gap de dualidad y dualidad fuerte”. Innóvate Perú” FINCyT: ECIP-1-P-087-14, 2016; Responsible in Perú, Instituto de Matemática y Ciencias Afines, IMCA-UNI, Perú.

Fondecyt-Conicyt:

- \* Main researcher of the Project FONDECYT 118-1316 (CONICYT-Chile): “From mathematical programming to calculus of variations without standard convexity”, April 2018 - March 2021.
- \* Main researcher of the Project FONDECYT 115-0973 (CONICYT-Chile): “Optimization theory and mathematical programming without standard convexity”, March 2015 - February 2018.
- \* Main researcher of the Project FONDECYT 112-0980 (CONICYT-Chile): “Further developments in nonconvex optimization and equilibria”, March 2012 - February 2015.
- \* Main researcher of the Project FONDECYT 110-0667 (CONICYT-Chile): “Unifying general vector optimization problems and optimality conditions”, March 2010 - February 2012.
- \* Main researcher of the Project FONDECYT 107-0689 (CONICYT-Chile): “Further development in multivalued complementarity problems and vector optimization”, March 2007 - February 2010.
- \* Main researcher of the Project FONDECYT 706-0106 (International Co-operation) (CONICYT-Chile): “Non-convex vector optimization and mathematical programming: existence and optimality conditions”, March 2006 - February 2007.

- \* Main researcher of the Project FONDECYT 104-0610 (CONICYT-Chile): “Non-convex vector optimization and mathematical programming: existence and optimality conditions”, March 2004 - February 2007.
- \* Main researcher of the Project FONDECYT 101-0116 (CONICYT-Chile): “Further developments in convex/non-convex optimization theory”, March 2001 - February 2004.
- \* Main researcher of the Project FONDECYT 199-0348 (CONICYT-Chile): “Nonclassical problems in optimization theory and Calculus of variations”, March 1999 - February 2001.
- \* Main researcher of the Project FONDECYT 197-0931 (CONICYT-Chile): “Further developments in the Calculus of Variations and Optimization Theory”, March 1997 - February 1999.
- \* Main researcher of the Project FONDECYT 195-1148 (CONICYT-Chile): “Some problems in Optimization in the absence of the Convexity/Superlinearity condition”, March 1995 - February 1997.

Fondap-Basal-Conicyt:

- \* Associate Researcher of the Basal Project (CONICYT-Chile) AFB170001, “Optimization and Equilibria”, CMM, Universidad de Chile, May 2008 - April 2021.
- \* Researcher of the Project FONDAP-Matemáticas Aplicadas II (CONICYT), May 2000 - December 2010: “Optimization and Equilibria”.
- \* Researcher of the Project FONDAP (CONICYT), May 1997 - December 1999: “Optimization” being responsible of the sub-project “Non-classical variational problems”.

Programa atracción e inserción de capital humano avanzado-CONICYT:

- \* Modalidad Estadía Corta 80122033: Direcciones asintóticas de segundo orden en teoría de optimización, Profesor Contraparte del Extranjero: Nicolas Hadjisavvas. University of the Aegean, Greece, 01 August 2013 - 31 January 2014.

Programa Regional MATH-AmSud-CONICYT:

- \* MATH-AmSud 17math-06: Coordinator of the Chilean team and Researcher “From monotonicity to dynamic and equilibrium: structures and applications”. 01 January 2017 - 31 December 2018.
- \* MATH-AmSud 13math-01: Researcher “Variational analysis and its applications to optimization, monotone operators, convex analysis and Nash equilibrium problems”. 01 January 2013 - 31 December 2014.

Fondef-Conicyt:

- \* Researcher of the Project FONDEF DO5I-10211 (CONICYT-Chile): “Herramientas para la formación de Profesores de Matemática”, March 2007 - December 2009.

- \* Researcher of the Project FONDEF DO2I-1090 (CONICYT-Chile): “Estándares para la Formación en Ciencias de Profesores de Enseñanza Media” (Area de Matemática), March - October 2005.

#### Ecos-Conicyt:

- \* Researcher of the Project ECOS-CONICYT (2010-033), January 2011 - December 2013. “*Optimización no Diferenciable y Análisis Variacional: Teoría y Aplicaciones*.”
- \* Researcher of the Project ECOS-CONICYT, January 1997 - December 1999: “Optimisation et Analyse non-linéaire” being responsible of the sub-project “Problèmes d’existence en calcul des variations”.

#### Universidad de Concepción:

- \* Researcher in the “Interdisciplinary Research Group on Applied Mathematics”, Dirección de Investigación, Universidad de Concepción, April 2001 - December 2003.

### PRESENT AND PAST RELEVANT DUTIES

#### Member of (International) Scientific Committee/Program:

- *IX Congreso Internacional de Matemática Aplicada y Computacional (CIMAC IX)* (August 06 - 09, 2019), Universidad Nacional Agraria La Molina (UNALM), Lima - Perú.
- *XXVII Congreso de Matemática Capricornio (COMCA)*, (July 25 - 27, 2018), Campus Coloso, Universidad de Antofagasta, Antofagasta - Chile.
- *XI Fast Workshop on Applied and Computational Mathematics* (January 04 - 06, 2018), Universidad Nacional de Trujillo, Escuela de Postgrado, Departamento de Matemáticas, Trujillo - Perú.
- *XII International Symposium of Generalized Convexity and Monotonicity* (August 27 - September 02, 2017), Institute of Mathematics, University of Debrecen, Hajdúszoboszló - Hungary.
- *XXX Jornadas de Matemática de la Zona Sur*, Universidad Católica de la Santísima Concepción, Concepción-Chile, April 26 - 28, 2017.
- *X Fast Workshop on Applied and Computational Mathematics* (January 06 - 07, 2017), Universidad Nacional de Trujillo, Departamento de Matemáticas, Trujillo - Perú.
- *Third International Conference on Set-Valued Variational Analysis and Set Optimization with Applications to Economics, Finance, Statistics and Game Theory* (16-19 September, 2016), Vienna University of Economics and Business, Vienna - Austria.
- *VIII Congreso Internacional de Matemática Aplicada y Computacional (CIMAC VIII)* (August 23 - 26, 2016), Universidad Nacional de Ingeniería, Facultad de Ciencias, Departamento de Matemáticas, Lima - Perú.
- *IX Fast Workshop on Applied and Computational Mathematics* (January 06 - 07, 2016), Universidad Nacional de Trujillo, Departamento de Matemáticas, Trujillo - Perú.
- *Modelling, Computation and Optimization in Information Systems and Management Sciences (MCO 2015)* (May 11 - 13, 2015), Lorraine University, Metz - France.
- *VII Congreso Internacional de Matemática Aplicada y Computacional (CIMAC VII)* (October 13 - 17, 2014), Universidad Nacional de Trujillo, Departamento de Matemáticas, Trujillo - Perú.

- *XI International Symposium of Generalized Convexity and Monotonicity* (August 25 - 30, 2014), IMPA, Río de Janeiro. Brazil.
- *2nd International Conference on Variational Analysis and Optimization*, (07 - 10 January, 2014), CMM, UChile, Santiago - Chile.
- *Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2012)* (17-21 December, 2012), Departamento de Matemática, FCE, Universidad Austral, Rosario - Argentina.
- *VI Congreso Internacional de Matemática Aplicada y Computacional (CIMAC VI)* (August 27 - 29, 2012), Universidad Nacional Jorge Basadre Grohmann de Tacna - UNJBG, Departamento de Matemáticas y Estadística, Tacna - Perú.
- *International Mini-Conference on Set-Valued Variational Analysis and Optimization with Applications in Finance* (16-19 August, 2012), Lutherstadt Wittenberg - Germany.
- *XXV Jornadas de Matemática de la Zona Sur*, Universidad de Concepción, Concepción - Chile, April 18-20, 2012.
- *X International Symposium of Generalized Convexity and Monotonicity* (August 22 - 27, 2011), Faculty of Mathematics and Computer Science, Babes-Bolyai University, Cluj-Napoca. Romania.
- *V Congreso Internacional de Matemática Aplicada y Computacional (CIMAC V)* (August 02 - 06, 2010), Universidad Nacional de San Antonio Abad del Cuzco, Facultad de Ciencias Químicas, Físicas y Matemáticas, Cuzco - Perú.
- Co-Chair of *The 2009 International Symposium on Optimization, Theory and Applications* (April 24 - 26, 2009), Sanya, Hainan - China.
- *IV Congreso Internacional de Matemática Aplicada y Computacional (CIMAC IV)* (September 15 - 19, 2008), Universidad Nacional Pedro Ruiz Gallo, Facultad de Ciencias Físicas y Matemática, Lambayeque - Perú.
- *IX International Symposium of Generalized Convexity and Monotonicity* (July 21 - 25, 2008), Department of Applied Mathematics, National Sun Yat-sen University, Kaohsiung - Taiwan.
- *III Congreso Internacional de Matemática Aplicada y Computacional (CIMAC III)* (January 30 - February 04, 2006), Universidad Nacional del Callao, Facultad de Ciencias Naturales y Matemática, Callao - Perú.
- *1st Euro-Latin American Workshop on Engineering Systems (SELASI2005)* (26-30 April, 2005), Universidad Nacional de Trujillo, Trujillo - Perú.
- *Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2004)* (15-18 December, 2004), Universidad Nacional de Trujillo, Trujillo - Perú.
- *LXXVI Encuentro Nacional de la Sociedad de Matemática de Chile* (28-30 October, 2004), Olmué - Chile.
- *LXXV Encuentro Nacional de la Sociedad de Matemática de Chile* (30-31 October and 1st November, 2003), Vicuña - Chile.
- *VI Simposio Internacional de Matemática*, Sociedad de Matemática de Chile (November 12-16, 2002), Universidad de Magallanes, Punta Arenas - Chile.
- *XI Congreso Latino-Iberoamericano de Investigación de Operaciones (XI CLAIO)* (October 27-31, 2002), Facultad de Ingeniería, Universidad de Concepción, Concepción - Chile.
- *5to Seminario Internacional en Optimización y Ciencias Afines* (October 01-05, 2001), Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI) and Instituto de Matemática y Ciencias Afines (IMCA), Lima - Perú.
- *XV Jornadas de Matemática de la Zona Sur*, Concepción-Chile, April 26-28, 2001.

- *4to Seminario Internacional en Matemática Aplicada y Optimización* (October 04-08, 1999), Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI), Lima - Perú.
- *1er Encuentro Latino Iberoamericano de Optimización (I ELIO) - 2do Congreso Chileno de Investigación Operativa (OPTIMA 97)* (November 06-08, 1997), Facultad de Ingeniería, Universidad de Concepción, Concepción - Chile.
- *3er Seminario Internacional en Matemática Aplicada y Optimización* (October 06-10, 1997), Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI), Lima - Perú.

Member of (International) Organizing Committee/Sessions:

- *XIII International Seminar on Optimization and Related Areas*, (October 09-13, 2017), Instituto de Matemática y Ciencias Afines, UNI, Lima - Perú.
- *XXX Jornadas de Matemática de la Zona Sur*, (April 26-28, 2017), Universidad Católica de la Santísima Concepción, Concepción - Chile.
- *Optimization and Equilibrium, Two days Workshop*, (April 24-25, 2017), Auditorio Dirección de Investigación, Universidad de Concepción, Concepción - Chile.
- *2nd International Conference on Variational Analysis and Optimization*, (07-10 January, 2014), CMM, UChile, Santiago - Chile.
- (Co-Chair) One-day Workshop, “*Optimization*”, Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, 29 November, 2013.
- Organizer and Chairman of the Sesión “Efficiency and vector optimization with applications” within the Mainstream “*Vector and set-valued optimization and applications*” at *26th European Conference on Operational Research (EURO XXVI 2013)*, University La Sapienza Tor Vergata, Rome-Italy, 01 - 04 July, 2013.
- Third Focus-Seminar, “*Optimization: Asymptotic analysis, strong duality and relaxation*”, CI<sup>2</sup>MA, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, 17 April, 2012.
- *The International Conference on Continuous Optimization (ICOOPT2010)*, (26-29 July, 2010), UChile, Santiago - Chile.
- *VI Italian - Latin American Conference on Applied and Industrial Mathematics (ITLA 2009)* (14-18 September, 2009), Facultad de Ciencias, Escuela Politécnica Nacional (EPN), Quito - Ecuador.
- One of the organizers of the Thematic Session “*Optimization and Control Theory*” within the *III Congreso Latino Americano de Matemáticos (III CLAM 2009)* (31 August - 04 September, 2009), Santiago - Chile.
- Chair of the Special Sesión on “Optimization” to the *LXXVI Encuentro Nacional de la Sociedad de Matemática de Chile* (28-30 October, 2004), Olmué - Chile.
- Chair of the Special Sesión on “Optimization and Calculus of Variations” to the *VI Simposio Internacional de Matemática*, Sociedad de Matemática de Chile (November 12-16, 2002), Universidad de Magallanes, Punta Arenas - Chile.
- Chair of the Special Session on “Optimization and Calculus of Variations”, at *XV Jornadas de Matemática de la Zona Sur*, Concepción-Chile, April 26-28, 2001.
- President and Director of the Summer School 2001, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, January 08-19, 2001.
- *VI Encuentro de Matemáticas y sus Aplicaciones* and *Cuarta Escuela Andina de Ecuaciones Diferenciales* (July 06-10, 1998), Facultad de Ciencias, Escuela Politécnica Nacional (EPN), Quito - Ecuador.



- President of *Seminario en Optimización Matemática* (July 05-09, 1993), Facultad de Ciencias, Universidad Nacional de Ingeniería (UNI), Lima - Perú.

Membership of International Scientific Societies:

- Member of the International Scientific Committee *Working Group on Generalized Convexity* (WGGC), 2006 - 2009; 2009 - 2012; 2012 - 2015; 2015 - 2018; 2018 - 2021.
- Member of the Scientific Committee of the *Sociedad de Matemática de Chile*, January 2000 – December 2005.

Referee of International Journals:

*Mathematics of Operations Research; Mathematical Programming, Section A: Section B; SIAM, J. on Control and Optimization; SIAM, J. on Optimization; Journal of Differential Equations; Journal of Optimization Theory and Applications; Journal of Global Optimization; Optimization; Positivity; Mathematical Methods of Operations Research; Journal of Convex Analysis; European Journal of Operational Research; Journal of Mathematical Analysis and Applications; Journal of Nonlinear and Convex Analysis; RAIRO-Operations Research; Operations Research Letter; Mathematical and Computer Modelling; Computers and Mathematics with Applications; Information Sciences; The Australian and New Zealand Industrial and Applied Mathematics Journal; Annales des Sciences Mathématiques du Québec; Journal of Inequalities and Applications; Fixed Point Theory and Applications.*

External Examiner of PhD theses:

- Sorin-Mihai Grad (Habilitation thesis) Fakultät für Mathematik, Technischen Universität Chemnitz, Germany, September 2013;
- Department of Mathematical Engineering (Universidad de Chile, Chile), May 2000, December 2004, May 2007, Julio López (July 2009); Emilio Vilches (July 2017); Bao Tran Nguyen (November 2017)
- Mohd Ishtyak, Department of Mathematics (Aligarh Muslim University, India), June 2018.
- Ruchi Arora, Department of Mathematics (University of Delhi, India), May 2010.
- A. Satyanarayana Murthy, Department of Mathematics (National Institute of Technology, Warangal - India), July, 2010.

External Evaluator/Referee for Scientific Agencies:

- Member of the Mathematics Adviser Committee (Grupo de Estudio de Matemática) at FONDECYT, *National Commission for Scientific and Technological Research* (CONICYT - Chile), May 2006 - June 2010.
- Member of the Evaluation Committee for Grants from “Programa de Capital Humano Avanzado”, CONICYT - Chile, November 2008 - February 2011.
- Member of the Evaluation Committee for Grants from “Línea de Inserción a la Academia”, CONICYT - Chile, June - August 2013.
- South Africa National Research Foundation (NRF), to evaluate and rating NRF researchers: July 2011.
- National Commission for Science and Technology (CONICYT-Chile): FONDECYT (National Fund for Scientific and Technological Development) Regular projects; FONDECYT Posdoct projects; ECOS-CONICYT; INRIA-CONICYT.
- National Agency of Evaluation and Prospecting (ANEP-Spain); ACSUCYL-Spain.

- Research projects from Argentina, Venezuela.

Reviewer:

- *Mathematical Reviews*, American Mathematical Society, since 1995.
- *Zentralblatt MATH*, since 2003.

Administrative Duties:

- Member of the Council of Departamento de Ingeniería Matemática, universidad de Concepción, Chile. May - July 2005; July 2006 - July 2012.
- Member of the Graduate Committee of the PhD Program in Applied Sciences with major in Mathematical Engineering, Departamento de Ingeniería Matemática, Universidad de Concepción, Chile. 1995 - 2002; July 2012 - to present.
- Director of Research and Posgraduate Sections, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, March 1999 – July 2001.

ADVISER OF THE FOLLOWING THESES

\* at undergraduate level awarding the degree in *Mathematical Engineering*

- “*Algoritmos Numéricos para la Resolución del Problema del Regulador Lineal*”, Lorena Muñoz. December 1995.
- “*Selecciones regulares para el subdiferencial de una función convexa y aplicaciones*”, Victor Puchi. March 1997.
- “*Un resultado tipo Liapunov en Cálculo de Variaciones*”, Verónica Briceño. May 1998.
- “*Eficiencia en Optimización multiobjetivo no convexa*”, Felipe Lara Obreque. 27 October 2010.
- “*Dualidad Fuerte en Optimización No Convexa*”, Gabriel Cárcamo Aravena. Defended on April 16, 2012.
- “*Análisis asintótico de segundo orden para el problema de minimización*”, Iván Andrés Montenegro Gómez. Defended on July 10, 2014.
- “*Convexidad de rango cuadrático en bajas dimensiones y aplicaciones en optimización cuadrática*”, Felipe Andrés Opazo Lagos. Defended on December 29, 2015.
- “*Una revisión de la teoría dualidad Lagrangiana con aplicaciones en optimización cuadrática no convexa*”, Stephanie Paola Caro Torres. Defended on October 21, 2016.

\* Master Thesis

- “*Vector equilibrium problems involving moving cones*”, Fernando Flores Bazán: Departamento de Matemática, Universidad de Concepción. Defended on November 30, 2001.

– “*On the representation of the  $\varepsilon$ - $\Phi$ -Subdifferential for a class on  $\Phi$ -convex functions with applications*”, Dante Carrasco Olivera: Departamento de Matemática, Universidad de Concepción. Defended on November 29, 2002.

– “*Dualidad Fuerte en Optimización No Convexa y Aplicaciones*”, Máximo Florean Chávez Santos: Facultad de Ciencias - IMCA, Universidad Nacional de Ingeniería, Lima, Perú. Defended on July 16, 2019.

\* Ph.D. Thesis

– “*Asymptotic Analysis in Equilibrium Problems*”, Rubén López Montoya, Degree awarded: Doctor en Ciencias Aplicadas c/m Ingeniería Matemática, Departamento de Ingeniería Matemática, Universidad de Concepción. Defended on January 07, 2005.

– “*Existence and Optimality Conditions in Nonconvex Vector Optimization*”, Cristián Vera Donoso, Degree awarded: Doctor en Ciencias Aplicadas c/m Ingeniería Matemática, Departamento de Ingeniería Matemática, Universidad de Concepción. Defended on March 15, 2006.

– “*Second Order Asymptotic Analysis in Optimization*”, Felipe Lara Obreque, Degree to award: Doctor en Ciencias Aplicadas c/m Ingeniería Matemática, Departamento de Ingeniería Matemática, Universidad de Concepción. Defended on October 14, 2015.

– “*Strong duality in non-convex optimization and related properties*”, Gabriel Cárcamo, Degree to award: Doctor en Ciencias Aplicadas c/m Ingeniería Matemática, Departamento de Ingeniería Matemática, Universidad de Concepción. Defended on November 29, 2018.

## CURRENT RESEARCH

### Main current fields of interest:

The study of non-convex optimization problems: from the existence of solutions: developing first and second order optimality condition, to characterize the validity of strong duality and the KKT-optimality conditions (beyond constraint qualification conditions). Moreover, develop first and second asymptotic analysis to capture the behaviour at infinity of convex and quasiconvex optimization problems. Withing the Calculus of variations we have special interest in studying the consequences of the lack of (convexity or quasiconvexity) weak lower semicontinuity and coercivity (superlinear growth condition) of the functional to be minimized. A non minor interest relies on generalized conjugation schemes for single and set-valued maps, together with its main implications in Optimization theory.

## SCIENTIFIC PUBLICATIONS

### Papers published in international refereed journals:

1. "Radially Symmetric Solutions of a Class of Problems of the Calculus of Variations without convexity assumptions", *Ann. Inst. Henri Poincaré Analyse non Linéaire*, **9** No 4 (1992), 465–478 (with A. Cellina).
2. "Existence Theorems for a Class of Non-convex Problems in the Calculus of Variations", *J. Optim. Theory Appl.*, **78** No 1 (1993), 31–48.
3. "The Lack of Lower Semicontinuity and Non-existence of Minimizers", *Nonlinear Analysis: TMA*, **23** No 1 (1994), 143–153.
4. "On Total Differential Inclusions", *Rendiconti del Seminario Matematico della Università di Padova*, **92** (1994), 9–16 (with A. Bressan).
5. "Multivariable Aumann Integral and Controlled Wave Equations", *Journal of Mathematical Analysis and Applications*, **189** No 2 (1995), 315–334 (with A. Bressan).
6. "On a notion of subdifferentiability for non-convex functions", *Optimization: a journal of mathematical programming and operations research*, **33** No 1 (1995), 1–8.
7. "On lower perturbations of a class of non-convex integrals", *Numerical Functional Analysis and Optimization*, **16** No 1 & 2 (1995), 111–125.
8. "Some Remarks about Relaxation Problems in the Calculus of Variations", *Proceedings of the Royal Society of Edinburgh Sect. A*, **126** No 3 (1996), 665–675.
9. "On Radial Solutions to Non-convex Variational Problems", *Houston Journal of Mathematics*, **22** No 1 (1996), 161–181.
10. "On minima of the difference of functions", *Journal Optimization Theory and Applications*, **93** No 3 (1997), 525–531.
11. "Approximate minima via the Ekeland variational principle", *Numerical Functional Analysis and Optimization*, **18** No 7 & 8 (1997), 777–788.
12. "Simplified Global Optimality Conditions in Generalized Conjugation Theory" (Chapter 14) in *Generalized Convexity, Generalized Monotonicity: Recent Results*, Jean-Pierre Crouzeix et al. (Eds.), Kluwer Academic Publishers, Boston, London, Dordrecht (1998) 305–329 (with J.E. Martínez-Legaz).
13. "Non-convex variational problems related to a hyperbolic equation", *SIAM, J. on Control and Optimization*, **37** No 6 (1999), 1751–1766 (with S. Perrotta).
14. "Optimal solutions in an allocation process for a continuum of traders", *J. of Global Optimization*, **16** No 2 (2000), 153–165.
15. "Existence theorems for generalized noncoercive equilibrium problems: the quasiconvex case", *SIAM, J. on Optimization*, **11** No 3 (2000), 675–690.
16. "Simplified optimality conditions for minimizing a difference of vector-valued functions", *J. of Optimization Theory and Applications*, **108** No 3 (2001), 571–586 (with W. Oettli).
17. "Optimality conditions in non-convex set-valued optimization", *Mathematical Methods of Operations Research*, **53** No 3 (2001), 403–417.

18. “A variational problem related to a continuous-time allocation process for a continuum of traders”, *J. of Mathematical Analysis and Applications*, **261** No 2 (2001), 448–460 (with J.-P. Raymond).
19. “Ideal, weakly efficient solutions for vector optimization problems”, *Math. Program., Ser. A*, **93** No 3 (2002), 453–475.
20. “Generalized vector quasi-equilibrium problems with applications”, *J. of Mathematical Analysis and Applications*, **277** No 1 (2003), 246–256 (with Q. H. Ansari).
21. “Vector equilibrium problems under asymptotic analysis”, *Journal of Global Optimization*, **26** No 2 (2003), 141–166 (with Fernando Flores-Bazán).
22. “Radial epiderivative and asymptotic functions in non-convex vector optimization”, *SIAM J. Optimization*, **14** No 1 (2003), 284–305.
23. “Existence theory for finite dimensional pseudomonotone equilibrium problems”, *Acta Applicandae Mathematicae*, **77** No 3 (2003), 249–297.
24. “Semi-strictly quasiconvex vector functions and non-convex vector optimization”, *Mathematical Methods of Operations Research*, **59** No 1 (2004), 129–145.
25. “The linear complementarity problem under asymptotic analysis”, *Mathematics of Operations Research*, **30** No 1 (2005), 73–90 (with Rubén López).
26. “On the representation of approximate subdifferentials for a class of generalized convex functions”, *Set-Valued Analysis*, **13** No 2 (2005), 151–166 (with Dante Carrasco Olivera).
27. “An iterative algorithm for random generalized nonlinear mixed variational inclusions for random fuzzy mappings”, *Applied Mathematics and Computation*, **167** No 2 (2005), 1400–1411 (with Rais Ahmad).
28. “Characterizing  $\mathbf{Q}$ -matrices beyond  $\mathbf{L}$ -matrices”, *Journal of Optimization Theory and Applications*, **127** No 2 (2005), 447–457 (with Rubén López).
29. “Asymptotic analysis, existence and sensitivity results for a class of multivalued complementarity problems”, *ESAIM, Control Optimization and Calculus of Variations*, **12** No 2 (2006), 271–293 (with Rubén López).
30. “Characterization of the nonemptiness and compactness of solution sets in convex and nonconvex vector optimization”, *J. Optimization Theory and Applications*, **130** No 2 (2006), 185–207 (with Cristián Vera).
31. “An optimal alternative theorem and applications to mathematical programming”, *J. of Global Optimization*, **37** No 2 (2007), 229–243 (with Nicolas Hadjisavvas and Cristián Vera).
32. “Characterizing efficiency without linear structure: a unified approach”, *J. of Global Optimization*, **41** No 1 (2008), 43–60 (with E. Hernández and V. Novo).
33. “Weak efficiency in multiobjective quasiconvex optimization on the real-line without derivatives”, *Optimization*, **58** No 1 (2009), 77–99 (with Cristián Vera).

34. “Strict efficiency in set-valued optimization”, *SIAM J. Control and Optimization*, **48** No 2 (2009), 881–908 (with Bienvenido Jiménez).
35. “Unifying efficiency and weak efficiency in generalized quasiconvex vector minimization on the real-line”, *International Journal of Optimization: Theory, Methods and Applications*, **1** No 3 (2009), 247–265 (with Cristián Vera).
36. “Asymptotically bounded multifunctions and the MCP beyond copositivity”, *Journal of Convex Analysis*, **17** No 1 (2010), 253–276.
37. “A Brezis-Browder principle on partially ordered spaces and related ordering theorems”, *J. of Math. Anal. Appl.*, **375** (2011), 245–260 (with César Gutiérrez and Vicente Novo).
38. “Non-negativity of information value in games, symmetry and invariance” in *Operations Research Proceedings*, Selected papers of the Annual International Conference of the German Operations Research Society (GOR), Bo hu, Karl Morasch, Stefan Picki and Markus Siegle (Eds.), Springer-Verlag, Berlin, Heidelberg (2011), 59–64. (with Sigifredo Laengle).
39. “A unified vector optimization problem: complete scalarizations and applications”, *Optimization*, **60** No 12 (2011), 1399–1419. (with Elvira Hernández).
40. “Gordan-type alternative theorems and vector optimization” (Chapter 2) in *Recent Developments in Vector Optimization*, Q. H. Ansari and J.-C. Yao (Eds), Springer-Verlag, Berlin, 2012, Vol. 1, 29–59. (with Fernando Flores-Bazán and Cristián Vera).
41. “A complete characterization of strong duality in nonconvex optimization with a single constraint”, *J. of Global Optimization*, **53** No 2 (2012), 185–201. (with Fernando Flores-Bazán and Cristián Vera).
42. “Inner and Outer estimates for the solution sets and their asymptotic cones in vector optimization”, *Optimization letters*, **6** No 7 (2012), 1233–1249. (with Felipe Lara).
43. “Maximal elements under reference-dependent preferences with applications to behavioral traps and games”, *J. Optimization Theory and Applications*, **155** No 3 (2012), 883–901. (with Dinh The Luc and Antoine Soubeyran).
44. “Strong duality in cone constrained nonconvex optimization”, *SIAM Journal on Optimization*, **23** No 1 (2013), 153–169. (with Giandomenico Mastroeni).
45. “Characterizing the efficient points without convexity and free-disposability”, *Central European Journal of Operations Research*, **21** No 2 (2013), 401–410. (with Gino Loyola and Sigifredo Laengle).
46. “Optimality conditions for a unified vector optimization problems with non-preordering relations”, *J. of Global Optimization*, **56** No 2 (2013), 299–315. (with Elvira Hernández).
47. “A geometric characterization of strong duality in nonconvex quadratic programming with linear and nonconvex quadratic constraints”, *Math. Program., Ser. A*, **145** No 1-2 (2014), 263–290. (with Gabriel Cárcamo).
48. “Fritz John necessary optimality condition of the Alternative-type”, *J. Optimization Theory and Applications*, **161** No 3 (2014), 807–818.

49. “On the convexity of the value function for a class of nonconvex variational problems: existence and optimality conditions”, *SIAM Journal on Control and Optimization*, **56** No 2 (2014), 3673–3693. (with Abderrahim Jourani and Giandomenico Mastroeni).
50. “Characterizing efficiency on infinite-dimensional commodity spaces with ordering cones having possibly empty interior”. *J. Optimization Theory and Applications*, **164** No 2 (2015), 455–478. (with Fernando Flores-Bazán and Sigifredo Laengle).
51. “Characterizing FJ and KKT conditions in nonconvex mathematical programming with applications”, *SIAM Journal on Optimization*, **25** No 1 (2015), 647–676. (with Giandomenico Mastroeni).
52. “Maximizing and minimizing quasiconvex functions: related properties, existence and optimality conditions via radial epiderivatives”, *J. of Global Optimization*, **63** No 1 (2015), 99–123. (with Fernando Flores-Bazán and Cristián Vera).
53. “Second order asymptotic analysis: basic theory”, *J. of Convex Analysis*, **22** No 4 (2015), 1173–1196. (with N. Hadjisavvas and Felipe Lara).
54. “First and second order asymptotic analysis with applications in quasiconvex optimization”, *J. Optimization Theory and Applications*, **170** No 2 (2016), 372–393. (with N. Hadjisavvas, F. Lara and I. Montenegro).
55. “Characterizing the convexity of joint-range for a pair of inhomogeneous quadratic functions and strong duality”, *Minimax Theory and its Applications*, **1** No 2 (2016), 257–290. (with Felipe Opazo).
56. “Computing the value of information in quadratic decision problems and its non-negative conditions”, *Optimization*, **66** No 8 (2017) 1337–1358. (with Sigifredo Laengle).
57. “Primal or dual strong-duality in nonconvex optimization and a class of quasiconvex problems having zero duality gap”, *J. Global Optimization*, **69** No 4 (2017) 823–845. (with W. Echegaray, Fernando Flores-Bazán, E. Ocaña).
58. “Strong duality and KKT conditions in nonconvex optimization with a single equality constraint and geometric constraint”, *Mathematical Program., Ser. B*, **168** No 1-2 (2018), 369–400. (with Gabriel Cárcamo).
59. “Proper or weak efficiency via saddle point conditions in cone-constrained nonconvex vector optimization”, *J. Optimization Theory and Applications*, **181** No 3 (2019), 787–816 (with G. Mastroeni).
60. “Zero-scale asymptotic functions and quasiconvex optimization”, *J. of Convex Analysis*, **26** (2019), to appear. (with N. Hadjisavvas).
61. “The standard quadratic optimization problem and its extensions: strong duality, optimality, hidden convexity and S-lemma” (with G. Cárcamo and S. Caro). *Applied Mathematics and Optimization*.  
DOI 10.1007/s00245-018-9502-0 Published online: 23 May 2018.

Monographs/Books:

62. “Optimización y Cálculo de Variaciones sin convexidad: Una Introducción”, Series Monografías del *Instituto de Matemáticas y Ciencias Afines* (I.M.C.A.), 109 pages, Lima-Perú, 1999.
63. “Optimización Lineal: Una Mirada Introductoria”, J. C. Sáez Editor, Santiago - Chile, 2011 (176 pages) (as part of the project FONDEF DO5I-10211 “Herramientas para la formación de profesores de matemáticas”).

Papers published in national refereed journals:

64. “Duality in Non-convex Optimization” (In spanish), *Actas of the Third Congress of Mathematics Capricornio, (COMCA '93)*, Antofagasta-Chile (17 pages).
65. “A constructive method for selections from the subdifferential of a convex function” (In Spanish), *Memorias del IV Encuentro de Matemática y sus Aplicaciones* (1994), pp. 167-180. Escuela Politécnica Nacional, Quito-Ecuador.
66. “Existence and non-existence in the Calculus of Variations” (Plenary Conference), *Memorias del LXVI Encuentro Sociedad de Matemática de Chile* (Valparaiso-Chile, October 28-29, 1994), pp. 02-11.
67. “El Rol de la Convexidad en Elasticidad Finita”, *Revista de la Facultad de Ciencias U.N.I.* (Lima-Perú), **1** No 1 (1995), 11-15.
68. “An introduction to the Calculus of Variations: the direct method and an indirect one” (In Spanish), *Revista de la Facultad de Ciencias U.N.I.* (Lima-Perú), **2** No 2 (1996), 12-30.
69. “A Liapunov-type result in the Calculus of Variations” (In Spanish), *Revista de la Facultad de Ciencias U.N.I.* (Lima-Perú), **4** No 1 (1999), 41-59 (with V. Briceño).
70. “Variational problems in Economics” (In spanish), *Revista de Física y Matemática* (FIS-MAT) de la Facultad de Ciencias, Escuela Politécnica Nacional (Quito-Ecuador), **VII** No 1 & 2 (1999), 90-114.