Francisco José Silva Álvarez

Assistant professor
Team MOD "Modelling, Optimization, Dynamics"
XLIM - DMI
UMR CNRS 7252
Faculté des Sciences et Techniques Université de Limoges

Employment

- *September* 2017- *:* Assistant professor (délégation CNRS), Toulouse School of Economics, Université Toulouse I, Capitole.

- *September* 2012- *:* Assistant professor, XLIM - DMI, Faculté des Sciences et Techniques, Université de Limoges.

- *March* 2011 - *August* 2012*:* Post-doctorate researcher at Dipartimento di Matematica "Guido Castelnuovo", Università La Sapienza, Rome, Italy.

    ◇ *Study subject:* Mean Field Games.

    ◇ *Supervisor:* I. Capuzzo-Dolcetta.

    ◇ *Secondment organisation:* Inria Saclay and Laboratoire Jacques-Louis Lions, Université Paris-Diderot (Paris 7), France.

Education

- 2016 *:* "Habilitation à diriger des recherches" at the University of Limoges.

    ◇ *Title of the thesis:* "Quelques contributions à la théorie de la commande optimale déterministe et stochastique".

    ◇ *Jury*: Y. Achdou (referee), G. Carlier (referee), E. Casas (referee), J.-F. Bonnans (examinator), P. Cardaliaguet (president of the jury), A. Jofré (examinator), F. Santambrogio (examinator), L. Thibault (examinator) and S. Adly (examinator).

- *September* 2007 - *November* 2010 *:* PhD. in Applied Mathematics at École Polytechnique, Palaiseau, France.

    ◇ *Title of the thesis:* "Interior penalty approximation for optimal control problems. Optimality conditions
    in stochastic optimal control theory".

⋄ *Advisor:* J.F. Bonnans.

⋄ *Jury:* J. F. Bonnans, J.P. Raymond (referee), A. Sulem (examinator), N. Touzi (president of the jury), S. Ulbrich (referee), J. Yong (referee).

⋄ *Mention*: Très honorable.

- 2001 **-** 2007 **:** Mathematical Engineer, Universidad de Chile.

⋄ *Title of the thesis:* "Uniform Fragmentation Process".

⋄ *Advisor:* J. Fontbona.

⋄ *Jury:* J. Fontbona, S. Martínez (referee) and J. San Martín (president of the jury and referee).

⋄ *Mention*: Highest Distinction.

Fellowships and Awards

- *2016-2020:* Awarded with the "Prime d'encadrement doctoral et de recherche (PEDR)".

- *April 2011- September 2012.-* Marie Curie post-doctoral fellowship within the ITN Marie Curie network SADCO (Sensitivity Analysis for Deterministic Controller Design).

- *September 2007- November 2010.-* PhD. CORDI INRIA fellowship.

- *Award:* Jean-Claude DODU Prize, "Prix Jeunes de la Meilleure Communication" (second award) for the talk "First and second order necessary conditions for stochastic optimal control problems" at MODE 2010: Conférence de la SMAI sur l'optimisation et la décision.

Visiting Positions

- *Imperial College*, one week in February 2018. Invited by D. Kalise.

- *University Federico Santa María*, March 2017. Invited by L. Briceño.

- *University Federico Santa María*, August 2016. Invited by L. Briceño.

- *University Federico Santa María*, January 2016. Invited by L. Briceño.

- *Center of Mathematical Modeling (CMM)*, August 2015. Invited by A. Jofré.

- *KAUST*, one week in June 2015. Invited by D. Gomes.

- *RICAM*, one week in March 2015. Invited by M.-T. Wolfram.

- *INRIA Saclay*, one week in October 2014. Invited by J.-F. Bonnans.

- *Toulouse School of Economics*, one week in April 2014. Invited by J. Bolte.

- *INRIA Saclay*, one week in April 2014. Invited by J.-F. Bonnans.

- *INRIA Saclay*, one week in January 2013. Invited by J.-F. Bonnans.

- *Université Montpellier II*, one week in April 2012. Invited by T. Bayen.

- *Toulouse School of Economics*, one week in November 2011. Invited by J. Bolte.

- *Center of Mathematical Modeling (CMM)*, July -August 2009. Invited by professor F. Alvarez.

- *Center of Mathematical Modeling (CMM)*, July -August 2008. Invited by professor F. Alvarez.

Research

Fields of Interest

- Mean Field Games.

- Analysis and Numerical Methods for first and second Order HJB equations.

- Deterministic Optimal Control of ODEs.

- Deterministic Optimal Control of PDEs.

- Stochastic Optimal Control Theory.

Publications

1. J. Backhoff and and F.-J. Silva. *Sensitivity analysis for expected utility maximization in incomplete Brownian market models*. **Mathematics and Financial Economics**. To appear.

2. L. Briceño-Arias, D. Kalise and F.-J. Silva. *Proximal methods for stationary mean field games with local couplings*, **SIAM J. Control Optim.** To appear.

3. A.-R. Mészáros and F.-J. Silva. *On the variational formulation of some stationary second order mean field games*. **SIAM J. Math. Anal.**, 52-1 (2018), pp. 1255-1577.

4. J. F. Bonnans, B. Heymann, P. Martinon, F. Lanas et G. Jimenez and F.-J. Silva. *Continuous Optimal Control Approaches to Microgrid Energy Management*. **Energy Systems**, 9-1 (2018), pp. 57-77.

5. R. David, O. Bachelier, T. Cluzeau F.-J. Silva, Na. Yeganefar and Ni. Yeganefar. *Structual stability, asymptotic stability, and exponential stability for linear multidimensional systems*. **International Journal of Control**. First online (2017).

6. E. Carlini, A. Festa, M.-T. Wolfram and F.-J. Silva. *A Semi-Lagrangian scheme for a modified version of the Hughes model for pedestrian flow*. **Dynamic Games and Applications**, 7-4 (2017), pp. 683-705.

7. J. Backhoff and F.-J. Silva. *Sensitivity results in stochastic optimal control: A Lagrangian perspective*- **ESAIM: COCV**, 23-1 (2017), pp. 39-70.

8. T. Bayen and F.-J. Silva. *Second order analysis for strong solutions in the optimal control of parabolic equations.* **SIAM J. Control Optim.**, 54-2 (2016), pp. 819-844.

9. J.-F. Bonnans, J. Gianatti and F.-J. Silva. *On the convergence of the Sakawa-Shindo algorithm in stochastic control.* **Mathematical Control and Related Fields**, 6-3 (2016), pp. 391-406.

10. F.-J. Silva. *Second order analysis for the optimal control of parabolic equations under control and final state constraints.* **Set-Valued and Variational Analysis**, 24-1 (2016), pp. 57-81.

11. A. R. Mészáros and F.-J. Silva. *A variational approach for second order mean field games with density constraints: the stationary case.* **Journal de Mathématiques Pures et Appliquées**, 104-6 (2015), 1135-1159.

12. E. Carlini and F. J. Silva. *A semi-Lagrangian scheme for a degenerate second order mean field game system.* **Discrete and Continuous Dynamical Systems-A.**, 35-9 (2015), pp. 4269-4292.

13. E. Carlini and F.-J. Silva *A fully-discrete Semi-Lagrangian scheme for a first order mean field game problem.* **SIAM J. Numer. Anal.**, 52-1 (2014), pp. 45–67.

14. T. Bayen, J.-F. Bonnans and F.-J. Silva. *Characterization of local quadratic growth for strong minima in the optimal control of semi-linear elliptic equations*. **Transactions of the American Mathematical Society**, 66-4 (2014), pp. 2063-2087.

15. J. F. Bonnans and F.-J. Silva. *First and second order necessary conditions for stochastic optimal control problems.* **Applied Mathematics and Optimization**, 65-3 (2012), pp. 403-439.

16. F. Camilli and F.-J. Silva. *A semi-discrete approximation for a first order mean field game problem*. **Network and Heterogeneous Media**, 7-2 (2012), pp. 263-277.

17. J. F. Bonnans and F.-J. Silva. *Error estimates for the logarithmic barrier method in linear quadratic stochastic optimal control problems*. **Systems and Control Letters**, 61-1 (2012), pp. 143-147.

18. F. Álvarez, J. Bolte, J.-F. Bonnans and F.-J. Silva. *Asymptotic expansions for interior penalty solutions of control constrained linear-quadratic problems*. **Mathematical Programming Series A**, 135-1 (2012), pp- 473-507.

19. J. F. Bonnans and F.-J. Silva. *Asymptotic expansion for the solutions of control constrained semilinear elliptic problems with interior penalties*. **SIAM J. Control Optim.** 49-6 (2011), pp. 2494-2517.

Preprints

1. J. F. Bonnans, J. Gianatti and F.-J. Silva. *On the time discretization of stochastic optimal control problems: the dynamic programming approach.* Accepted, under minor revisions, in **ESAIM: Control, Optimisation and Calculus of Variations**.

2. E. Carlini, F.-J. Silva. *On the discretization of some nonlinear Fokker-Planck-Kolmogorov equations and applications.* Under revision in **SIAM J. on Numerical Analysis**.

3. E. Carlini, F.-J. Silva. *A fully discrete scheme for systems of nonlinear Fokker-Planck-Kolmogorov equations*, en collaboration avec E. Carlini. In revision, as a book chapter, in **Springer INdAm Series**.

4. L. Briceño-Arias, D. Kalise, Z. Kobeissi, M. Laurière, A. Mateos González and F.-J. Silva. *On the implementation of a primal-dual algorithm for second order time-dependent mean field games with local couplings*. Submitted.

Book chapters

1. F.-J. Silva. *On second order conditions in the optimal control of partial differential equations*. In *Novel Directions in Optimization, Control and Games with Applications*. **Lecture Notes in Mathematics, Springer.** (2017).

2. R. Guglielmi and F.-J. Silva. *A Brief Survey on Semi-Lagrangian Schemes for Mean Field Games.*In *Novel Directions in Optimization, Control and Games with Applications*. **Lecture Notes in Mathematics, Springer.** (2017).

Publications in proceedings with referee reports

1. J. Fontbona, H. Ramírez, V. Riquelme and F.-J. Silva. *Stochastic modelling and control of bioreactors*. **IFAC-PapersOnLine**. 50-1 (2017), pp. 12611-12616.

2. R. David, O. Bachelier, T. Cluzeau, F.-J. Silva, Na. Yeganefar and Ni. Yeganefar. *Structural and asymptotic stability: A counterexample*. **IFAC-PapersOnLine**. 50-1 (2017), pp. 1853-1858.

3. E. Carlini, A. Festa and F.-J. Silva. *The Hughes model for pedestrian dynamics and congestion modelling*. **IFAC-PapersOnLine**. 50-1 (2017), pp. 1655-1660.

4. E. Carlini and F.-J. Silva. *A Semi-Lagrangian scheme for the Fokker-Planck equation*. **IFAC-PapersOnLine**. 49-8 (2016) pp. 272-277.

5. B. Heymann, J.-F. Bonnans, G. Jiménez and F.-J. Silva. *A Stochastic Continuous Time Model for Microgrid Energy Management*. **European Control Conference (ECC)** (2016).

6. R. David, N. Yeganefar, F.-J. Silva and O. Bachelier. *Existence and uniqueness of solutions of continuous nonlinear 2D Roesser models: the locally Lipschitz case*. **9th international Workshop on Multidimensional (nD) Systems (nDS'15), Vila Real** (2015).

7. R. David, N. Yeganefar, F.-J. Silva and O. Bachelier. *Existence and uniqueness of the solutions of continuous nonlinear 2D Roesser models*. **European Control Conference (ECC)**, (2015).

8. E. Carlini and F.-J. Silva. *Semi-Lagrangian schemes for mean field game models*. **52nd IEEE Conference on Decision and Control**, (2013).

9. T. Bayen and F.-J. Silva. *Weak and strong minima : from calculus of variation towards PDE optimization*.**IFAC Proceedings Volumes**, 46-26 (2013), pp. 150-154.

10. F. Alvarez, J. Bolte, J.-F. Bonnans and F.-J. Silva. *Error estimates for the solution of a control constrained optimal control problem with interior penalties*. **IFAC Proceedings Volumes**, 42-2 (2009), pp. 120-123.

Teaching Experience

2017-2018: Délégation CNRS (no teaching).

2016-2017: 192 hours

- *Probability and Statistics, Course and TD*. ENSIL.
- *Mathematical tools in Sciences, Course and TD*. Université de Limoges.
- *Mathematics III, TD*. Université de Limoges.
- *Numerical Analysis, Course and TD*. Université de Limoges.

2015-2016: 192 hours

- *Probability and Statistics, Course and TD*. ENSIL.
- *Statistics for Biology, TD*. Université de Limoges.
- *Mathematics III, TD*. Université de Limoges.
- *Numerical Analysis, Course and TD*. Université de Limoges.

2014-2015: 162 hours

- *Probability and Statistics, Course and TD*. ENSIL.
- *Statistics for Biology, TD*. Université de Limoges.
- *Mathematics III, TD*. Université de Limoges.
- *Mathematics II, TD*. Université de Limoges.
- *Mini-cours on mean field games*. "École d'été pluridisciplinaire en théorie de jeux", Aussois, France.
- *Mini-cours on mean field games*. CMM, Santiago, Chili.

2013-2014: 128 hours

- *Statistics for Biology, TD*. Université de Limoges.
- *Numerical Analysis, TD*. Université de Limoges.
- *Convex Analysis, Course and TD*. Université de Limoges.

- *Optimal Control, Course.* Université de Limoges.

2012-2013 : 128 hours

- *Mini-cours on mean field games.* Workshop Sadco, Funchal, Portugal.
- *Statistics for Biology, TD.* Université de Limoges.
- *Numerical Analysis, TD.* Université de Limoges.
- *Optimization, Course and TD.* Université de Limoges.
- *Optimal Control, Course.* Université de Limoges.

2012 : 8 hours

- *Stochastic optimal control.* Université La Sapienza.

2010 : 16 hours

- *TD and TP on Quadratic Optimization.* ENSTA.

2007–2008 : 60 hours

- *TD on Optimization .* Universidad de Chile.
- *TD on Statistics.* Universidad de Chile.
- *TD on Stochastic Processes and Applications.* Universidad de Chile.

2006–2007 : 120 hours

- *TD on Introduction to Algebra.* Universidad de Chile.
- *TD on Nonlinear Optimizaion.* Universidad de Chile.
- *TD on Linear Algebra.* Universidad de Chile.
- *TD on Statistics.* Universidad de Chile.
- *TD on Probability and Stochastic Processes.* Universidad de Chile.

2005–2006 : 80 hours

- *TD on Calculus of Several Variables.* Universidad de Chile.
- *TD on Probability and Stochastic Processes.* Universidad de Chile.
- *TD on Linear Algebra.* Universidad de Chile.

2004–2005 : 20 hours

- *TD on Calculus of Several Variables.* Universidad de Chile.

Administrative responsibilities, supervision, thesis committee, participation to research projects and colloquium organization

- Administrative responsibilities

    - 2013 - : Secretary of the group SMAI-MODE (Mathématiques de l'Optimisation et de la Décision).

- Supervision

    - 2017 : Supervision of the M2 thesis *Nonsmooth analysis and optimal control theory. An overview* by Thi Nhu-Thao Nguyen (Université de Limoges). Thi is currently doing a PhD at the Université de Bençanson, entitled *"Theory, numerics and control for conservation laws on networks"*
    - 2017 : Co-supervision, in collaboration with L. Briceño-Arias, D. Kalise and M. Laurière, of two students, A. Mateos Gonzales and Z. Kobeissi, on a numerical project about Mean Field Games in the framework of the summer school CEMARCS 2017.

- Thesis committee

    - April 2018 : Examiner of the thesis by Rossana Capuani, Université Roma II, Tor-Vergata.
    Advisors: P. Cannarsa and P. Cardaliaguet.

    - November 2017 : Examiner of the thesis by Sylvain Gibaud, Université Toulouse III - Paul Sabatier.
    Advisors: L. Miclo and J. Renault.

    - November 2016 : Examiner of the thesis by Mathieu Laurière, Université Paris-Diderot.
    Advisor: Y. Achdou.

    - September 2016 : Examiner of the thesis by Victor Riquelme, Unversidad de Chile.
    Advisors: H. Ramírez and A. Rapaport.

    - September 2015 : Examiner of the thesis by Alpar R. Mészáros, Laboratoire de mathématiques d'Orsay.
    Advisor: F. Santambrogio.

- Projects

    - 2018 - : Member of the project *Mean-field games and applications*. The coordinator is D. Gomes (KAUST).

    - 2016 - 2021 : Member of the project ANR *MFG: Mean Field Games*.

    - 2016 - : Member of the project PGMO : *VarPDEMFG: "Variational and PDE methods in Mean Field Games".*

    - 2016 - 2017 : Together with D. Tonon (Dauphine), we were the coordinators of the project *PEPS-INSMI, "Some open problems in Mean Field Games".*

    - Member of the project ANR *MSDOS: "Systèmes multidimensionnelles, digression sur la stabilité".*

    - 2014 - 2016 : Member of the project *MathAmsud 15MATH-02: "Sparse Optimal Control of Differential Equations: Algorithms and Applications".*

    - 2012 - 2016 : Coordinator of the project PGMO : *PASTOR: "Perturbation analysis for deterministic and stochastic optimal control problems".*

    - 2013 - 2014 : Coordinator of the project XLIM-VIP: *"Une nouvelle approche Mathématique pour la Gestion de l'Energie dans les Réseaux Intelligents".*

- Scientific committee

  - Member of the international scientific committee in the conference *"18th International Symposium on Dynamic Games and Applications"*, July, 2018, Grenoble, France.

- Colloquium organization

  - Organizer of a session on Mean Field Games in the conference *"18th International Symposium on Dynamic Games and Applications"*, July, 2018, Grenoble, France.
  - Co-organizer of the session *"Mean Field Games and applications"* in the conference *"12th AIMS Conference on Dynamical Systems, Differential Equations and Applications"*, July, 2018, Taipei, Taïwan.
  - Co-organizer of the conference *"Control and Optimization Conference on the occasion of Frédéric Bonnans 60th birthday"*, November, 2017, Palaiseau, France.
  - Co-organizer of the session *"Mean Field Games and applications"* in the conference *journées PGMO*, November, 2017, Palaiseau, France.
  - Co-organizer of the mini-symposium *"Jeux à champ moyen et applications"* in the conference *SMAI 2017*, June, 2017, Ronce-les-Bains, France.
  - Co-organizer of the mini-symposium *"Recent developments in numerical methods for Hamilton-Jacobi-Bellman equations and multi-agents systems"* in the conference *WONAPDE 2016*, January, 2016, Concepción, Chile.
  - Co-organizer of the workshop *"Stochastic Optimization: Theory and applications to energy management"*, June, 2014, Limoges, France.
  - Co-organizer of the mini-symposium *"Stochastic optimal control and applications"* in the conference *SIAM conference on optimization*, May, 2014, San Diego, USA.
  - Organizer of the mini-symposium *"Optimality conditions in optimal control of PDEs"* in the conference *ICCOPT 2013, The Fourth International Conference on Continuous Optimization*, August, 2013, Lisbon, Portugal.

Conference Presentations and Seminars

- Invited presentations:

  - *Interaction models: Mean Field Games, pattern formation and related topics*, January, 2018, Padoue, Italy.
  - *Mean field games and related topics - 4*, June, 2017, Rome, Italy.
  - *PDE Models for Multi-agent Phenomena*, November, 2016, Rome, Italy.
  - *First Joint Meeting Brazil – Italy in Mathematics*, August, 2016, Rio de Janeiro, Brazil.
  - *6th Conference ALEL*, June, 2016, Cartagena, Spain.
  - *Workshop on Optimal Control of Partial and Ordinary Differential Equations*, November, 2015, Palaiseau, France.
  - *4th LAWOC conference*, July, 2014, Lima, Peru.
  - *5th Conference ALEL*, June, 2014, Seville, Spain.
  - *2nd International Conference on Variational Analysis and Optimization en l'honneur de Lionel Thibault*, January, 2014, Santiago, Chile.
  - *2ème rencontre ANR: "Hamilton-Jacobi equations on heterogeneous structures and networks"*, June, 2013, Rennes, France.
  - *Workshop on Mathematics of Energy Finance and Natural Resource Management*, March, 2013, Santiago, Chile.
  - *Septièmes Journées Franco-Chiliennes d'Optimisation,* December, 2011, Perpignan, France.

- International conferences:

  - *12th AIMS Conference on Dynamical Systems, Differential Equations and Applications"*, July, 2018, Taipei, Taïwan.
  - *Control and Optimization Conference on the occasion of Frédéric Bonnans 60th birthday*, November, 2017, Palaiseau, France.
  - *MCA 2017, Mathematical congress of the Americas*, July, 2017, Montréal, Canada.
  - *20ème congrès mondial de l'IFAC*, July, 2017, Toulouse, France.
  - *28th European Conference on Operational Research*, July, 2016, Poznan, Poland.
  - *15th annual European Control Conference*, June, 2016, Aalborg, Danemark.
  - *WONAPDE 2016*, January, 2016, Concepción, Chile.
  - *Sixteenth International Symposium on Dynamic Games and Applications (ISDG)*, July, 2014. Amsterdam, Netherlands.
  - *SIAM Conference on Optimization*, May, 2014, San Diego, USA.
  - *SADCO Young Research Workshop*, January, 2014, Berlin, Germany.
  - *ICCOPT 2013, The Fourth International Conference on Continuous Optimization*, August, 2013, Lisbon, Portugal.
  - *Workshop: Stochastic Optimization - Models and Algorithms, HIM*, May, 2013, Bonn, Germany.
  - *2012 Mathematical Programming Symposium*, August, 2012, Berlin, Germany.
  - *Second industrial workshop of SADCO project*, February, 2012, Stuttgart, Germany.
  - *III Latin American Workshop on Optimization and Control*, January, 2012, Valparaíso, Chile.
  - *The 15th AFG conference on Optimization*, September, 2011, Toulouse, France.
  - *ICCOPT* 2010*, The international conference on continuous optimization*, July, 2010, Santiago, Chile.
  - 14-*th Belgian-French-German Conference on Optimization*, September, 2009, Leuven, Belgium.
  - *IFIP Conf. System Modeling and Optimization.* July, 2009, Buenos Aires, Argentina.
  - *SMAI* 2009, May 2009, La Colle-sur-Loup, France. *Poster presentation*.
  - *Control Applications of Optimization*, May, 2009, Jivaskyla, Finland.

- National conferences:

  - *Workshop ANR MFG*, March, 2018, Tours, France.
  - *Workshop ANR MFG*, March, 2017, Nice, France.
  - *Congrès SMAI 2017*, June, 2017, Ronce-Les-Bains, La Tremblade, France.
  - *PGMO days 2016*, November, 2016, Palaiseau, France.
  - *PGMO days 2015*, October, 2015, Palaiseau, France.
  - *Conference on Optimization and Practices in Industry (COPI)*, October, 2014, Paris, France.
  - *Stochastic Optimization: Theory and applications to energy management*, June, 2014, Limoges, France.
  - *Conference on New Trends in Optimal Control*, June, 2014, Tours, France.
  - *ALEL 2012*, July, 2012, Limoges, France.
  - *Conférence MODE 2012: Mathématiques de l'Optimisation et de la décision*, March, 2012, Dijon, France.
  - *MODE 2010 : Conférence de la SMAI sur l'optimisation et la décision*, March, 2010, Limoges, France.
  - *Sixième Journée Optimeo a l'École Polytechnique*, March, 2010, Palaiseau, France.
  - *GdR* 3273 *Mathématiques de l'Optimisation et Applications*, October, 2009, Porquerolles, France.
  - *Journée de bilan de a chaire Modélisation Mathématique et Simulation Numérique à l'École Polytechnique*, September, 2009, Palaiseau, France.

- *Conference on Optimization and Practices in Industry*, November, 2008, Paris, France.

- <u>Seminars</u>:

  - *Seminar MAD-STAT at the university Toulouse I, Capitole*, March, 2018, Toulouse, France.
  - *Seminar "Applied PDEs Seminar" at the Imperial College*, March, 2018, London, England.
  - *Seminar SPOT*, February, 2018, Toulouse, France.
  - *Séminaire Parisien de théorie de jeux*, January, 2018, Paris, France.
  - *Seminar SPOC*, January, 2017, Bourgogne, France.
  - *Seminar "IMA-PUCV"*, PUCV, August, 2016, Valparaíso, Chile.
  - *Seminar "Optimization and equillibrium"*, CMM, Universidad de Chile, January, 2016, Santiago, Chile.
  - *Seminar "Optimization and equillibrium"*, CMM, Universidad de Chile, August, 2015, Santiago, Chile.
  - *Seminar "KAUST"*: KAUST, June, 2015, Thuwal, Saudi Arabia.
  - *Seminar "RICAM"*: RICAM, March, 2015, Linz, Austria.
  - *Seminar "Decision Mathematics Seminar"*, TSE, April, 2014, Toulouse, France.
  - *Seminar "COMMANDS"*, École Polytechnique, April, 2014, Palaiseau, France.
  - *Seminar"Optimization and equillibrium"*, CMM, Universidad de Chile, March, 2013, Santiago, Chile.
  - *Seminar "MODEMIC"*, INRA, January, 2014, Montpellier, France.
  - *Seminar "EDP"*, Université de Lorraine, November, 2013, Metz, France.
  - *Seminar"Modellistica Differenziale Numerica"*, La Sapienza, November, 2011, Rome, Italy.
  - *Summer school "CIME - Summer School in applied mathematics: HJB equations: approximations, numerical analysis and applications"*, August, 2011, Cetraro, Italy.
  - *Summer school on Calculus of Variations and Applications*, CIRM, July, 2011, Marseille, France.
  - *Seminar "Modellistica Differenziale Numerica" at La Sapienza*, May, 2011, Rome, Italy.
  - *Seminar "Optimización y equilibrio"*, CMM, Universidad de Chile, March, 2011, Santiago, Chile.
  - *Summer school on the optimal control of PDEs*, July, 2010, Cortona, Italy.
  - *Seminar "Optimización y equilibrio"*, , CMM, Universidad de Chile, August, 2009, Santiago, Chile.
  - *Seminar "COMMANDS"*, ENSTA, June, 2009, Paris, France.
  - *Seminar of Phd students on game theory at Paris VI*, April, 2009, Paris, France.
  - *Seminar of Phd students at the École Polytechnique*, March, 2009, Palaiseau, France.

Miscellaneous

<u>Referee</u>: Mathematical Reviews, SIAM Journal on Optimization, SIAM Journal on Control and Optimization, SIAM Journal on Numerical Analysis, Mathematical Programming, Mathematics of Operation Research, Discrete and Continuous Dynamical Systems, Networks and Heterogeneous Media, Optimization Methods and Software, Journal of Optimization Theory and Applications, Journal of Global Optimization, Journal of Dynamics Games and Applications, Automatica, IEEE TAC, Numerical Functional Analysis and Optimization, Numerical Algebra, Control and Optimization.

- *Languages:* Spanish (mother tongue), English (advanced), French (advanced), Italian (advanced).

- *Computer Skills:* Matlab, Java, LATEXand Scilab.

Last updated: March 5, 2018