



Monica MOTTA

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Personal

Date of birth 1 May 1965
Place of birth Verona, Italy
Other Married, a son and a daughter (1997, 2003)

Employment

9 Nov. 2020 – **ASN Prima Fascia**, 01/A3 Analisi Matematica, Probabilità e Statistica Matematica
1 Nov. 1998 – **Associate Professor (Mat05)**, *Dip. di Matematica Tullio Levi-Civita*, Univ. di Padova, Italy
July '95 – Oct. '98 **Ricercatrice Universitaria (Fisica Mat.)**, *Dip. di Matematica Tullio Levi-Civita*, Univ. di Padova, Italy

Education

1990–1994 **Ph.D. in Mathematics**, *Università degli Studi di Padova*, Italy,
Thesis: *Su certe classi di problemi di ottimizzazione riguardanti opportuni sistemi meccanici Lagrangiani, eventualmente dotati di discontinuità strutturali. Sulla teoria matematica dei controlli.*
Supervisors: Prof. Aldo Bressan and Prof. Franco Rampazzo
1984–1989 **Master Degree in Mathematics**, *Università degli Studi di Padova*, Italy, 110/110
Supervisor: Prof. Aldo Bressan

Teaching activities

Courses and short courses Master and PhD level

AA 2024–25 **Lecturer**, *Nonlinear Analysis*, Master Degree in Mathematics, Univ. of Padova in collaboration with Prof. Daniela Tonon (32h).
AA 2023–24 **Lecturer**, *Nonlinear Analysis*, Master Degree in Mathematics, Univ. of Padova with the collaboration of Prof. Daniela Tonon (32h).
AA 2022–23 **Lecturer**, *Advanced Analysis*, Master Degree in Mathematics, Univ. of Padova responsible Prof. Giovanni Colombo (20h).
AA 2021–22 **Lecturer**, *Advanced Analysis*, Master Degree in Mathematics, Univ. of Padova responsible Prof. Giovanni Colombo (20h).
AA 2020–21 **Organizer**, *Dynamic Optimization*, Ph.D. Course in Mathematics, Univ. of Padova thought by Prof. Richard Vinter during a month-long visit, with funds I obtained from INdAM competitive call for visiting scientists (12h).
AA 2019–20 **Lecturer**, *Introduction to optimal control theory*, Ph.D. Course in Mathematics, Univ. of Padova responsible Prof. Franco Rampazzo (8h).
March 2017 **Lecturer**, *Non commutativity and impulsive control systems*, Ph.D. level course, Imperial College, London (10h).
Sept. 2017 **Lecturer**, *On the mathematical theory of control*, Ph.D. Course in Mathematics, Dipartimento di Matematiche, Università "I. Qemali", Vlore, Albania Program Erasmus+, (10h).

Bachelor degree courses

AA 21/22–24/25 **Lecturer**, *Math. Analysis 1*, Bachelor Degree in Computer and Electronics Engineering, Univ. of Padova (96h).
AA 2020–21 **Sabbatical year**
AA 18/19–19/20 **Lecturer**, *Math. Analysis 2*, Bachelor Degree in Mechanical Engineering, Univ. of Padova responsible of two courses, (72+72h).

- AA 1998/99–2017/18 **Lecturer**, *Math. Analysis 1 and/or 2*, Bachelor Degree in Management/Mechanical Engineering, Univ. of Padova, branch of Vicenza per year, (120h).
- AA 1994/95–97/98 **Lecturer**, *Rational Mechanics*, Degree in Mathematics, Univ. of Padova responsible of the course Prof. Aldo Bressan, per year, (60h).
- Supervision activities**
- Nov. 2023–Aug. 2024 **Research Project Supervisor**, Dr. Giovanni Fusco, 1-year "Type A" research grant, Univ. of Padova
Dr. Fusco has now a 3-year research grant at the Louisiana State University, supervisor Prof. M. Malisoff
- April-June 2023 **Master Thesis Supervisor**, Mathematics student Pedro Otavio de Souza Mussatto, from the "Universidade Estadual Paulista", Sao Jose do Rio Preto, SP, Brazil, Univ. of Padova winner of a scholarships under the "Marco Garuti programme for foreign students"
- Nov. 2019–Oct. 2022 **PhD Supervisor**, Dr. Giovanni Fusco, PhD student in Mathematics, Univ. of Padova
PhD Thesis: *Gap Phenomena in Optimal Control with State Constraints*
- AA 2019-20 **Supervisor**, a Bachelor thesis in Mechanical Engineering, Univ. of Padova
- AA 1998-17 **Supervisor**, 2 Bachelor theses and one Master thesis in Management Engineering (laurea triennale and Vecchio Ordinamento), Univ. of Padova, branch of Vicenza
- Other activities**
- Oct. 2019 – **Member of the "Collegio di Dottorato in Scienze Matematiche"**, *Dip. di Matematica Tullio Levi-Civita*, Univ. of Padova
- 2024 **Co-organizer**, *MATH-TEA & MATH-IA: Sorseggiando il Futuro*, Progetto per il miglioramento della Didattica 2024, Dip. di Matematica Tullio Levi-Civita, Univ. of Padova
- 2022 **Participant**, *Communicating and Teaching in English*, I attended the 30-hour course, Univ. of Padova
- 2017-18 **Participant**, *T4L@VI: progetto per l'innovazione didattica nei corsi di laurea del DTG*, Dip. di Tecnica e Gestione dei sistemi industriali, Vicenza, Univ. of Padova
- 2016 **Participant**, *Teaching4Learning (T4L)*, first seminars of the project, Univ. of Padova (I was one of the promoters of the T4L group in Vicenza)

| Research topics

My research interests mainly deal with modern developments of classical subjects in Control Theory, exploiting interactions between Nonsmooth Analysis, Geometric Control approach, PDEs and Viscosity methods. Among the problems I worked are

- (a) **Properties of impulsive control systems with time delays**
- (b) **Asymptotic controllability, stabilizability and Lyapunov functions**
- (c) **Gap (or Lavrentiev) phenomena in optimal control**
- (d) **Pontryagin maximum principle in optimal impulsive control**
- (e) **Properties of limit solutions to control systems with unbounded controls**
- (g) **Deterministic and stochastic optimal control and viscosity solutions of Hamilton Jacobi equations**

| Publications

Journal papers

53. G. Fusco, M. Motta, R. Vinter, (2024) *Optimal impulse control problems with time delays: An illustrative example*. Systems & Control Letters 193, Paper No. 105940, 7 pp.
52. A.C. Lai, M. Motta, (2024) *A converse Lyapunov-type theorem for control systems with regulated cost*. Journal of Optimization Theory and Applications 203, no. 1, 386–418.
51. G. Fusco, M. Motta, F. Rampazzo, (2024) *A Lie-bracket-based notion of stabilizing feedback in optimal control*. Optimization, doi 10.1080/02331934.2024.2374516, <http://arxiv.org/abs/2302.08915>
50. G. Fusco, M. Motta, (2024) *A note on impulsive solutions to nonlinear control systems*. IEEE Control Systems Letters 8, 832–837.
49. G. Fusco, M. Motta, R. Vinter, (2024) *Optimal impulsive control for time delay systems*. SIAM J. Control Optim. 62, no. 8, 2012–2035.
48. G. Fusco, M. Motta, (2024) *Impulsive optimal control problems with time delays in the drift term*. Mathematical Control and Related Fields (Special issue in honor of Helene Frankowska for her 70th birthday), Volume 14, Issue 4, 1306–1333.

47. G. Fusco, M. Motta, (2024) *Strict sense minimizers which are not extended minimizers and abnormality*. Mathematics, 12, no. 943, 21 pp.
46. G. Fusco, M. Motta, F. Rampazzo, (2023) *HJ inequalities involving Lie brackets and feedback stabilizability with cost regulation*. Appl. Math. Optim. 88, no. 2, Paper No. 52, 35 pp. 88
45. M. Motta M., M. Palladino, F. Rampazzo, (2022) *Unbounded Control, Infimum Gaps, and Higher Order Normality*, SIAM J. Control Optim. 60 , no. 3, 1436–1462.
44. G. Fusco and M. Motta, (2022) *Nondegenerate abnormality, controllability, and gap phenomena in optimal control with state constraints*, SIAM J. Control Optim. 60, no. 1, 280–309.
43. G. Fusco and M. Motta, (2022) *Gap phenomena and controllability in free end-time problems with active state constraints*, J. Math. Anal. Appl. 510, no. 2, Paper No. 126021, 25 pp.
42. A.C. Lai and M. Motta, (2022) *Converse Lyapunov theorems for control systems with unbounded controls*. Journal of Differential Equations 312, 347–373.
41. G. Fusco and M. Motta, (2021) *No Infimum Gap and Normality in Optimal Impulsive Control Under State Constraints*. Set-Valued Var. Anal. 29, no. 2, 519–550.
40. A. C. Lai and M. Motta, (2021), *Stabilizability in optimization problems with unbounded data*. Discrete Contin. Dyn. Syst. 41, no. 5, 2447–2474.
39. M. Motta and C. Sartori, (2020), *Normality and nondegeneracy of the Maximum Principle in optimal impulsive control under state constraints*. Journal of Optimization Theory and Applications, Vol. 185, 44–71.
38. M.S. Aronna, M. Motta, F. Rampazzo, (2020), *A Higher-Order Maximum Principle for Impulsive Optimal Control Problems*, SIAM J. Control Optim., 58(2), 814–844.
37. A. C. Lai and M. Motta, (2020), *Stabilizability in optimal control*, NoDEA Nonlinear Differential Equations Appl., 27, no. 41, 32 pp.
36. M. Motta, F. Rampazzo, and R. Vinter, (2018), *Normality and Gap Phenomena in Optimal Unbounded Control*. ESAIM Control, Optimisation and Calculus of Variations 24, no. 4, 1645–1673.
35. M. Motta, (2018) *Minimum time problem with impulsive and ordinary controls*. Discrete & Continuous Dynamical Systems-A, 38 (11) : 5781–5809.
34. M. Motta and F. Rampazzo, (2018), *Asymptotic controllability and Lyapunov-like functions determined by Lie brackets*, SIAM J. Control Optim. 56, no. 2, 1508–1534.
33. M. Motta and C. Sartori, (2018), *On L^1 limit solutions in impulsive control*, Discrete Contin. Dyn. Syst. Ser. S 11, no. 6, 1201–1218.
32. M. Motta and C. Sartori, (2018), *Lack of BV bounds for impulsive control systems*, J. Math. Anal. Appl. 461, no. 1, 422–450.
31. M. Motta, Anna Chiara Lai and F. Rampazzo, (2016), *Minimum Restraint Functions for unbounded dynamics: general and control-polynomial systems*, Pure App. Funct. Anal. 1, no. 4, 583–612.
30. M. Motta and C. Sartori, (2015) *Asymptotic problems in optimal control with a vanishing Lagrangian and unbounded data*. Discrete Contin. Dyn. Syst. 35, no. 9, 4527–4552.
29. M.S. Aronna, M. Motta and F. Rampazzo, (2015) *Infimum gaps for limit solutions*. Set-Valued Var. Anal. 23, no. 1, 3–22.
28. M. Motta and C. Sartori, (2015) *The value function of an asymptotic exit-time optimal control problem*. NoDEA, Nonlinear Differential Equations Appl. 22, no. 1, 21–44.
27. M. Motta and C. Sartori, (2014) *On asymptotic exit-time control problems lacking coercivity*, ESAIM Control, Optimisation and Calculus of Variations, 20, no. 04, 957–982.
26. M. Motta and F. Rampazzo, (2013), *Asymptotic controllability and optimal control*. J. Differential Equations 254, no. 7, 2744 –2763.
25. M. Motta and C. Sartori, (2011) *On the value function of weakly coercive problems in nonlinear stochastic control*. Appl. Math. Optim. 64, no. 1, 71–100.
24. M. Motta and C. Sartori, (2011) *Generalized solutions to nonlinear stochastic differential equations with vector-valued impulsive controls* Discrete Contin. Dyn. Syst., vol. 20, no. 2, pp. 595-613.
23. M. Motta and C. Sartori, (2010), *Weakly coercive problems in nonlinear stochastic control: Existence of optimal controls*. SIAM J. Control Optim. Volume 48, Issue 5, pp. 3532-3561
22. M. Motta and C. Sartori, (2008), *Uniqueness of solutions for second order Bellman-Isaacs equations with mixed boundary conditions*. Discrete Contin. Dyn. Syst. , vol. 20, 4, pp. 739-765.
21. M. Motta and C. Sartori, (2008), *Uniqueness results for boundary value problems arising from finite fuel and other singular and unbounded stochastic control problems*, Discrete Contin. Dyn. Syst. 21, no. 2, 513–535.

20. M. Motta and C. Sartori, (2007), Finite fuel problem in nonlinear singular stochastic control. *SIAM J. Control Optim.* 46, no. 4, 1180–1210.
19. M. Motta, F. Rampazzo, (2006), *Nonsmooth multi-time Hamilton-Jacobi Systems*. Indiana University Mathematical Journal, vol. 55, no. 5, 1573–1614.
18. M. Motta, (2004), *Viscosity solutions of HJB equations with unbounded data and characteristic points*. *Appl. Math. Optim.* 49 no. 1, 1–26.
17. M. Motta, C. Sartori, (2003), *Minimum time with bounded energy, minimum energy with bounded time*. *SIAM J. Control Optim.* 42 no. 3, 789–809
16. M. Motta, C. Sartori, *Semicontinuous viscosity solutions to mixed boundary value problems with degenerate convex Hamiltonians*. *Nonlinear Analysis* 49 (2002) 905–927.
15. M. Motta, F. Rampazzo, (2000), *Multivalued dynamics on a closed domain with absorbing boundary. Applications to optimal control problems with integral constraints* *Nonlinear Analysis*, vol.41, pp. 631-647
14. M. Motta, C. Sartori, (1999), *Discontinuous solutions to unbounded differential inclusions under state constraints. Applications to optimal control problems*. *Set-Valued Anal.*, vol. 7, no. 4, pp.295–322
13. M. Motta, F. Rampazzo, (1999), *State constrained control problems with neither coercivity nor L^1 bounds on the controls*. *Ann.Mat.Pura e Appl.*, vol.4,pp.117–142
12. M. Motta, C. Sartori, (1999) *Exit-time problems for nonlinear unbounded control systems*. *Discr. Cont. Dyn. Syst.*, vol.5, pp. 137–156
11. M. Motta and F. Rampazzo, (1997), *The value function of a slow growth control problem with state constraints*. *Jour. of Math. Systems, Estimation and Control*, vol. 7, no. 3, pp. 375–378
10. M. Motta and F. Rampazzo, (1996), *Space–time trajectories of nonlinear systems driven by ordinary and impulsive controls*. *Jour. of Differential and Integral Eqs*, vol. 8, no. 2, pp. 199–225
9. M. Motta and F. Rampazzo, (1996), *Dynamic programming for nonlinear systems driven by ordinary and impulsive controls*. *SIAM J. Control Optim.* 34, no. 1, pp.199–225
8. M. Motta and F. Rampazzo, (1996), *Nonlinear systems with unbounded controls and state constraints: a problem of proper extension*. *NODEA (Nonlinear Differential Eqs and Appl.)*, vol. 3, pp. 191–216
7. M. Motta, (1995), *On nonlinear optimal control problems with state constraints*. *SIAM Jour. on Control and Optimization*, vol. 33, pp. 1411-1424
6. Aldo Bressan and M. Motta, (1995), *Structural discontinuities to approximate some optimization problems with a non monotone impulsive character*. *Rend.Mat. Acc. Lincei*, s. IX, vol. 6, pp. 93-109 (1995)
5. Aldo Bressan and M. Motta, (1994) *Some optimization problems with a monotone impulsive character. Approximation by means of structural discontinuities*. *Mem. Mat. Acc. Lincei*, s. IX, vol. 2, pp. 31–52
4. Aldo Bressan and M. Motta, (1994), *On control problems of minimum time for Lagrangian systems similar to a swing. I. Convexity criteria for sets*. *Rend.Mat. Acc. Lincei*, s. IX, vol. 8
3. Aldo Bressan and M. Motta, (1994), *On control problems of minimum time for Lagrangian systems similar to a swing. II. Application of convexity criteria to certain optimum time problems*. *Rend.Mat. Acc. Lincei*, s. IX, vol. 8
2. Aldo Bressan and M. Motta, (1993-4), *On minimum time problems for a pendulum with variable length and a conjecture based on a law of Galilei*. *Atti dell'Istituto Veneto di Lettere ed arti, classe di Scienze Fis. Mat. e Nat.* Tomo CLII, pp. 305–314
1. Aldo Bressan and M. Motta, (1993), *A class of mechanical systems with some coordinates as controls. A reduction of certain optimization problems for them. Solution methods*. *Mem. Mat. Acc. Lincei*, s. IX, vol. 2, pp. 5–30

Proceedings

8. G. Fusco, M. Motta, *A note on impulsive solutions to nonlinear control systems*, proceedings of the 63th IEEE Conference on Decision and Control (CDC) December 16-18, 2024. Milan, Italy.
7. G. Fusco and M. Motta, *Strict sense minimizers which are relaxed extended minimizers in general optimal control problems*, proceedings of the 60th IEEE Conference on Decision and Control (CDC) December 13-15, 2021. Austin, Texas.
6. M. Motta and F. Rampazzo, *High order Lyapunov-like functions for optimal control*, Proceedings in the Special Issue "24th International Symposium on Mathematical Theory of Networks and Systems MTNS 2020, Cambridge, UK, IFAC PapersOnLine **54-9** (2021), 273–278.
5. M.S. Aronna, M. Motta, F. Rampazzo, *Necessary conditions involving Lie brackets for impulsive optimal control problems*, Proceedings of the IEEE 58th Annual Conference on Decision and Control (CDC), Nice, France, 11–13 Dec. 2019.

4. A. C. Lai and M. Motta, *Stabilizability in impulsive optimization problems*, Proceedings of the 11th IFAC Symposium on Nonlinear Control Systems, NOLCOS, Vienna, IFAC-PapersOnLine, **52** (2019), 352–357.
3. M. Motta and F. Rampazzo, *On an Extended Notion of Controllability*, Invited regular paper to the 18th IFAC World Congress (2011, Milan)
2. M. Motta and C. Sartori, *On Some Infinite Horizon Cheap Control Problems with Unbounded Data*, Invited regular paper to the 18th IFAC World Congress (2011, Milan)
1. M. Motta and C. Sartori, *The value function of a finite fuel problem for a new class of singular stochastic controls*. Invited regular paper to the IEEE Conference on Decision and Control, CDC (2008, Cancun-Mexico)

Preprints

1. G. Fusco, M. Motta, R. Vinter, *Optimal Control Problems with Vector-Valued Impulse Controls and Time Delays*. Submitted. Available at <https://doi.org/10.48550/arXiv.2408.17342>

| Talks and seminars

Invited

- 2024 ○ **Time delay impulsive systems in optimal control**, *Control of state constrained dynamical systems, 3rd Edition*, 24–27 September 2024, Dip. di Matematica Tullio Levi-Civita, Padova
- 2024 ○ **Optimal impulsive control for nonlinear time delay systems**, *Seminar at the invitation of Dr. Michele Palladino*, May 22, 2024, DISIM, Università dell'Aquila
- 2022 ○ **HJB inequalities involving Lie brackets and feedback stabilizability with cost regulation**, *Two-day workshop on deterministic and stochastic control*, September 6-7 2022, Politecnico of Milan, Italy
- 2022 ○ **Unbounded Control, Infimum Gaps, and Higher Order Normality**, *Workshop on Optimal Control Theory*, June 22-24, 2022, INSA Rouen, Normandie (France)
- 2022 ○ **Stabilizability in optimal control**, *Seminar at the invitation of Professor Michael Malisoff*, May 13, 2022, LSU Department of Mathematics, Louisiana State University, USA (online)
- 2022 ○ **Unbounded Control, Infimum Gaps, and Higher Order Normality**, *Mind the gap: new results on the Lavrentiev phenomenon*, Special session in the French-German-Portuguese Conference on Optimization, May 03-06, 2022, at Faculty of Economy of the University of Porto (FEP), Porto, Portugal
- 2021 ○ **Stabilizability in optimal control**, *Seminar at the invitation of Professor Yuri Ledyae*, November 19, 2021, WMU Department of Mathematics, Western Michigan University, USA (online)
- 2021 ○ **Unbounded Control, Infimum Gaps, and Higher Order Normality**, *Seminar as part of the cycle of seminars "Differential equations and Applications"*, July, 2021, Dipartimento di Matematica "Tullio Levi-Civita", Padova, Italy (online)
- 2021 ○ **Nondegenerate abnormality, controllability, and gap phenomena in optimal control with state constraints**, *Optimal control of ODEs, PDEs and applications*, Special session in the 13th International Conference on Large-Scale Scientific Computations (LSSC 2021), June 7-11, 2021, Sozopol, Bulgaria (online)
- 2021 ○ **Nondegenerate abnormality, controllability, and gap phenomena in optimal control with state constraints**, *Optimal control of ODEs, PDEs and applications*, Special session in the 13th International Conference on Large-Scale Scientific Computations (LSSC 2021), June 7-11, 2021, Sozopol, Bulgaria (online)
- 2020 ○ **Higher-order maximum principle for impulsive optimal control problems**, *Qualitative and Quantitative Techniques for Differential Equations arising in Applied and Natural Sciences*, Special session in the 13th AIMS Conference, June 5-9, 2020, Atlanta, USA [cancelled due to Covid-19 sanitary crisis]
- 2020 ○ **Stabilizability in optimization problems with unbounded data**, *Control and Optimization: new developments and applications*, Special session in the 13th AIMS Conference, June 5-9, 2020, Atlanta, USA [cancelled due to Covid-19 sanitary crisis]
- 2020 ○ **Normality and Nondegeneracy of the Maximum Principle in Optimal Impulsive Control under state constraints**, *Geometry and Analysis in control theory*, April 16-17th 2020, Università di Padova [cancelled due to Covid-19 sanitary crisis]

- 2019 ○ **Necessary conditions involving Lie brackets for impulsive optimal control problems**, *Optimality conditions for control problems*, Special Session in the 58th IEEE Conference on Decision and Control (CDC), December 2019, Nice, France
- 2019 ○ **Stabilizability in optimization problems with unbounded data**, *Workshop on optimal control and mean field games*, October 2019, Rio de Janeiro, Brazil
- 2019 ○ **Stabilizability in Impulsive Optimization Problems**, *Set-Valued and Nonsmooth Analysis in Systems and Control: Generalized Lyapunov Methods and Beyond II*, Invited Session in IFAC MECHATRONICS & NOLCOS 2019, August 2019, Vienna, Austria
- 2018 ○ **Lack of BV bounds for impulsive control systems**, *Optimal control and differential games: Recent developments in theory and applications*, Special session in the 12th AIMS Conference, August 2018, Taipei, Taiwan
- 2018 ○ **Normality and Gap Phenomena in Optimal Unbounded Control**, *Control and Optimization: new developments and applications*, Special session in the 12th AIMS Conference, August 2018, Taipei, Taiwan
- 2017 ○ **Normality and Gap Phenomena in Impulsive Control**, *Control of state constrained dynamical systems*, September 2017, Padova, Italy
- 2016 ○ **Noncommutativity and impulsive control systems**, *Seminar at the invitation of Dr. Maria Soledad Aronna*, September, 2016, School of Applied Mathematics of the Fundacao Getulio Vargas, Rio de Janeiro, Brazil
- 2016 ○ **Unbounded variation and solutions of impulsive control systems**, *First Joint Meeting Brazil Italy of Mathematics*, September 2016, Rio de Janeiro, Brazil
- 2016 ○ **Lyapunov-like functions and Lie brackets**, *Optimal Control and Applications*, Special session in the 11th AIMS Conference, August 2016, Orlando, Florida
- 2013 ○ **Nonlinear singular stochastic control: graph completions in some optimization problems**, *One-day Workshop "Free-Boundary Problems, Optimal Stopping and the Commodity Market*, 2013, Roma, Italy
- 2012 ○ **On exit times and infinite horizon problems with a vanishing lagrangian**, *SADCO Summer School & Workshop 2012 New Trends in Optimal Control*, 2012, Ravello, Italy
- 2012 ○ **Asymptotic controllability with a cost**, *Control Day*, 2012, Padova, Italy
- 2001 ○ **Minimum time and minimum energy functions for nonlinear systems with controls in L^p , $p \geq 1$** , *IFAC symposium on nonlinear control systems, NOLCOS 2001*, 2001, San Pietroburgo, Russia
- Others**
- 2024 ○ **A note on impulsive solutions to nonlinear control systems**, *Optimal Control IV*, Regular session in the 63th IEEE Conference on Decision and Control (CDC), 16-18 December 2024, Milan, Italy
(Speaker and chair)
- 2021 ○ **Strict sense minimizers which are relaxed extended minimizers in general optimal control problems**, *Optimal Control II*, Regular session in the 60th IEEE Conference on Decision and Control (CDC), 13-17 December 2021, Austin, Texas, USA
(Speaker and chair, online)
- 2011 ○ **On an extended notion of controllability**, *8th IFAC World Congress*, 2011, Milan, Italy
- 2009 ○ **Weakly coercive problems in nonlinear singular stochastic control"**, *WCNAO 2009, Workshop on Control, Nonsmooth Analysis and Optimization in honour of F. Clarke and R. Vinter*, 2009, Porto, Portugal
- 2008 ○ **Weakly coercive problems in nonlinear singular stochastic control"**, *Viscosity, metric and control theoretic methods in nonlinear PDEs: analysis, approximations, applications*, 2008, Roma "La Sapienza", Italy
- 2001 ○ **Regularity of the solutions of HJB equations in the presence of characteristic points**, *Fifth SIAM Conference on Control and its applications*, 2001, San Diego, USA
- 2000 ○ **Semicontinuous viscosity solutions to mixed boundary value problems with degenerate convex Hamiltonians**, *Viscosity Solutions and Applications*, 2000, Bressanone, Italy
- 1999 ○ **Semicontinuous viscosity solutions of Hamilton-Jacobi-Bellman equations with discontinuous Hamiltonians**, *EQUADIFF 1999, International Conference on Differential Equations*, 1999, Berlin, Germany
- 1999 ○ **Minimum time function for linear systems with controls in L^p , $p \geq 1$** , *International Conference in memory of S. N. Kruzhkov*, June, 1999, Besancon, France

- 1996 ○ **On nonlinear optimal control problems with slow growth and state constraints**, *DSDE 1996, International conference on Dynamical Systems and Differential Equations*, June, 1996, Springfield, Missouri, USA
- 1995 ○ **Unbounded control problems with state constraints**, *C.I.M.E. Course Viscosity solutions and applications*, 1995, Montecatini Terme, Italy

| Scientific visits and scientific guests

Scientific visits

- May 2024 ○ **DISIM, L'Aquila, Italy**, collaboration with Dr. Michele Palladino
(Ongoing collaboration which has led to the writing of article [45] in the list above)
- April 2024 ○ **Roma La Sapienza, Italy**, collaboration with Dr. Anna Chiara Lai
(Ongoing collaboration which has led to the writing of articles [52], [42], [40], [37], [31] and proceeding [4] in the lists above)
- July 2023 ○ **Imperial College, London**, collaboration with Prof. Richard Vinter
(Ongoing collaboration which has led to the writing of articles [53], [49], [36] and preprint [1] in the lists above)
- March 2023 ○ **Roma La Sapienza, Italy**, collaboration with Dr. Anna Chiara Lai
- June 2022 ○ **Roma La Sapienza, Italy**, collaboration with Dr. Anna Chiara Lai
- July 2020 ○ **Imperial College, London**, collaboration with Prof. Richard Vinter
[cancelled due to Covid-19 sanitary crisis]
- Sept. 2020 ○ **School of Applied Mathematics of the Fundação Getúlio Vargas (FGV), Rio de Janeiro, Brazil**, collaboration with Assistant Professor Maria Soledad Aronna
[cancelled due to Covid-19 sanitary crisis]
- Oct. 2019 ○ **School of Applied Mathematics of the Fundação Getúlio Vargas (FGV), Rio de Janeiro, Brazil**, collaboration with Assistant Professor Maria Soledad Aronna
(collaboration which has led to the writing of articles [38], [29] and of proceeding [5] in the lists above)
- Sept. 2017 ○ **University of Vlore, Albania**, invited by Prof. Ermal Feleqi, Program Erasmus+ AA 2016/17-2017/18 (verso Paese Partner): Departamenti i Matematikes, Universiteti "I. Qemali", Vlore, Albania
(I took the Ph.D. Course (10h): "On the mathematical theory of control")
- March 2017 ○ **Imperial College, London**, collaboration with Prof. Richard Vinter
(During the visit I also took the Course (10h): "Non commutativity and impulsive control systems")
- Sept. 2016 ○ **School of Applied Mathematics of the Fundação Getúlio Vargas (FGV), Rio de Janeiro, Brazil**, collaboration with Dr. Maria Soledad Aronna

Scientific guests

- February 2025 ○ **Dip. di Matematica Tullio Levi-Civita, Padova, Italy**, collaboration with Dr. Anna Chiara Lai, Univ. Roma La Sapienza, Italy
- February 2024 ○ **Dip. di Matematica Tullio Levi-Civita, Padova, Italy**, collaboration with Dr. Anna Chiara Lai, Univ. Roma La Sapienza, Italy
- September 2022 ○ **Dip. di Matematica Tullio Levi-Civita, Padova, Italy**, collaboration with Prof. Richard Vinter, Imperial College, London
- Dec. 2021 ○ **Dip. di Matematica Tullio Levi-Civita, Padova, Italy**, collaboration with Dr. Anna Chiara Lai, Univ. Roma La Sapienza, Italy
- September 2021 ○ **Dip. di Matematica Tullio Levi-Civita, Padova, Italy**, collaboration with Prof. Richard Vinter, Imperial College, London
(during this period Prof. Vinter took also a 12 hours course entitled "Dynamic Optimization")

| Fundings

Research Projects as Principal Investigator

- 2023–25 ○ **BIRD 2023, Optimality, controllability and stabilizability for constrained problems: non-smoothness and geometric features, impulses and delays**, codice *MOTT_BIRD23_01*, Univ. of Padova
Participants: Franco Rampazzo, Francesco Rossi, Pierpaolo Soravia, Giovanni Fusco. Total amount: 16.7 k.
- 2023 ○ **INdAM-GNAMPA, Problems with constrained dynamics: non-smoothness and geometric aspects, impulses and delays**, CUP E53C22001930001
Participants: Francesca Angrisani (L'Aquila), Michele Palladino (L'Aquila), Anna Chiara Lai (Roma La Sapienza), Franco Rampazzo (Padova), Giovanni Colombo (Padova). Total amount: 3 k.

- 2020 ○ **INdAM-GNAMPA**, *Extended control problems: gap, higher order conditions and Lyapunov functions*
Participants: Giovanni Fusco, Anna Chiara Lai (Roma La Sapienza), Franco Rampazzo, Michele Palladino (GSSI L'Aquila). Total amount: 2 k.
- 2018–21 ○ **SID 2018**, *Controllability, stabilizability and infimum gaps for control systems*, codice *MOTT_SID18_01*, Univ. of Padova
Participants: Giovanni Colombo, Carlo Mariconda, Franco Rampazzo and Francesco Rossi. Total amount: 19.5 k.
- 2017 ○ **INdAM-GNAMPA**, *Optimal impulsive control: higher order necessary conditions and gap phenomena*
Participants: Anna Chiara Lai (Roma), Franco Rampazzo, Andrey Sarychev (Firenze) e Caterina Sartori. Total amount: 1.6 k.
- Research Projects as Participant**
- 2023 – 25 ○ **PRIN 2022**, *Optimal control problems: analysis, approximation and applications*, P.I. Giovanni Colombo, Prot. 2022238YY5, CUP C53D23002370006
Associated investigators: Cristina Pignotti (L'Aquila), Elisabetta Carlini (Roma "La Sapienza"). Total amount: 274.6 k.
- 2024 ○ **INdAM-GNAMPA**, *Non-smooth Optimal Control Problems*, P.I. Franco Rampazzo (ex Francesca Angrisani)
- 2022 ○ **INdAM-GNAMPA**, *Optimal Control of the Moreau's Sweeping process and Impulsive Control Systems*, P.I. Michele Palladino (GSSI).
- 2008 – ○ **DOR-EX 60**, *Nonlinear Differential Equations*, P.I. Pierpaolo Soravia.
- 2016 – 18 ○ **PRAT 2016**, *Control of dynamics with reactive constraints*, project CPDA153228, P.I. Giovanni Colombo
- 2014 – 16 ○ **PRAT 2014**, *Aspetti analitici e geometrico-differenziali nella Teoria del Controllo Non Lineare, con applicazioni alla Meccanica*, P.I. Franco Rampazzo
- 2014 – 16 ○ **MARIE CURIE NETWORK**, *Sensitivity analysis for nonlinear control problems: theory, numerical methods and applications*, project n. 264735, Local P.I. Fabio Ancona Bayreuth-Germany; Leuven, Belgium; London (Imperial College), UK; Paris 6 - Univ. Pierre et Marie-Curie, France; Paris-INRIA; Porto - Portugal; Roma, Padova, - Italia
- 2023 – 25 ○ **PRIN 2012**, *Metodi di viscosità, geometrici e di controllo per modelli diffusivi nonlineari*, P.I. Prof. Italo Capuzzo-Dolcetta, local P.I. Prof. Martino Bardi
- Others**
- 2023 – 24 ○ **Research Project Supervisor**, *1-year "Type A" research grant 2023*, Title: Impulsive control systems: optimization and stabilization in the presence of time delays; links with some controlled Moreau's Sweeping processes, (winner Dr. Giovanni Fusco)
- 2020 ○ **Recipient**, *INdAM-GNAMPA grant 2020*, for a 20-days visiting professor position, Invited Professor: Richard Vinter, Imperial College, London UK

| Organization of conferences and workshops

- 2024 ○ **Control of state constrained dynamical systems, 3rd edition**, *September 24-27, 2024*, Padova, Italy
- 2024 ○ **Joint meeting AMS-UMI**, *July 23-26, 2024*, Palermo, Italy, Special session on *New advances in the mathematical theory of control*
- 2023 ○ **AIMS 2023**, *May 31-June 4, 2023*, Wilmington, NC, USA, Special session on *Control and Optimization: new developments and applications*, (online)
- 2021 ○ **60th IEEE Conference on Decision and Control (CDC)**, *December 11-13, 2021*, Austin, Texas, USA, Special session on *Optimal Control: theoretical developments and novel applications*, (online)
- 2020 ○ **Geometry and Analysis in control theory**, *April 16-17, 2020*, Padova, Italy
[cancelled due to Covid-19 sanitary crisis]
- 2020 ○ **AIMS 2020**, *June 5-9, 2020*, Atlanta, USA, Special session on *Control and Optimization: new developments and applications*
[cancelled due to Covid-19 sanitary crisis]
- 2019 ○ **9th International Congress on Industrial and Applied Mathematics (ICIAM)**, *July 2019*, Valencia, Spain, Minisymposia: *Recent Advances in Optimal Control Theory*
- 2019 ○ **Control Days**, *May 2019*, Padova, Italy
- 2018 ○ **AIMS 2018**, *July 2018*, Taipei, Taiwan, Special session on *Control and Optimization: new developments and applications*
- 2018 ○ **Optimization, State Constraints and Geometric Control**, *May 2018*, Padova, Italy

- 2017 ○ **Control of state constrained dynamical systems, 1st edition**, September 2017, Padova, Italy
- 2016 ○ **AIMS 2018**, July 2016, Orlando, Florida, Special session on *Optimal Control and Applications*
- 2014 ○ **INdAM Workshop *Analisi e geometria nella teoria del controllo e nelle sue applicazioni***, June 2014, Roma, Italy
- 2013 ○ **Control Days**, September 2013, Padova, Italy

| Editorial activities

- 2024 – ○ **Member of the Executive Editorial Board**, *Journal Topological Methods in Nonlinear Analysis (TMNA)*, published by the Juliusz Schauder University Center for Nonlinear Studies at the Nicolaus Copernicus University in Toruń, Poland, (ISSN 1230-3429)
- 2024 – ○ **Co-guest editor**, (with P. Soravia), *AIMS Mathematics*, Special issue on Mathematical Control of Nonlinear Systems and its Applications, (ISSN 2473-6988)
- 2019 – ○ **Topic editor**, *Mathematics*, MDPI, St Alban-Anlage 66, CH-4052 Basel, Switzerland , (ISSN 2227-7390)
- 2018 ○ **Co-editor**, (with A.J. Zaslavski), *Discrete Contin. Dyn. Syst. Ser. S*, vol. 11 (2018), no. 6, Special issue on recent advances in control and optimization
- 2015 ○ **Co-editor**, (with P. Bettiol, P. Cannarsa, G. Colombo, F. Rampazzo), *Analysis and geometry in control theory and its applications*, Springer INdAM Series 11, (2015)
- 2015 ○ **Reviewer for MIUR**, *Evaluation Program of the project for young Researchers "Rita Levi Montalcini"*
- 2014 ○ **Reviewer for MIUR**, *SIR Program*, Decreto del 23 gennaio 2014 prot. n. 197
- 2004 – ○ **Reviewer for Mathematical Reviews**
- 1995 – ○ **Reviewer for scientific journals**, (*SICON*, *SIAM Jour. on Control and Optim.*, *Jour. of Nonlinear Analysis*, *JDEQ*, *Jour. of Differential Equations*, *ESAIM:COCV- Control Optimization and Calculus of Variations*, *IMA Journal of Mathematical Control and Information*, *AMOP*, *Applied Mathematics and Optimization*, *IEEE Transactions on Automatic Control*, *JOTA*, *Journal of Optimization Theory and Applications*, *JMAA*, *Journal of Mathematical Analysis and Applications*, *Rendiconti del Seminario Matematico di Padova*, *MOR*, *Mathematics of Operations Research*, *International Journal of Robust and Nonlinear Control*, *Automatica*, *Elsevier*, *Applied Mathematical Modelling*, *Elsevier*, *DCDS-A*, *Discrete and Continuous Dynamical System - A*, *IGTR*, *International Game Theory Review*, *VJOM*, *Vietnam Journal of Mathematics*, *Elsevier*, *Applicable Analysis*, *Communications on Pure and Applied Analysis*, *Mathematical Control and Related Fields*, *International Journal of Control*, *Journal of the Franklin Institute Elsevier*, *PAFA*, *Pure and Applied Functional Analysis*, *JOGO*, *Journal of global optimization*, *JDCS*, *Journal of Dynamical and Control Systems*, *Physica D: Nonlinear Phenomena*, *IFAC Proceedings*, *CDC Proceedings*, *Control and Decision Conference*, et al.)

| Other activities

Affiliations to scientific groups

- Since the 1990s ○ **INdAM-GNAMPA**, *Section of Calculus of Variations, Control Theory and Optimization*, Research Unit of Padova
- 2022 – ○ **UMI**, *Affiliation to the Unione Matematica Italiana*

Committees

- June 2024 – ○ **Member of the "Commissione Orari DII"**, *Scuola di Ingegneria*, Univ. di Padova
- April 2023 – ○ **Member of the "Commissione Selezione Tutor Junior"**, *Scuola di Ingegneria*, Univ. di Padova
- April 2023 – ○ **Member of the "Commissione Paritetica Docenti-Studenti"**, *Scuola di Ingegneria*, Univ. di Padova
- 2014 – ○ **In charge of the elaboration of the "Contributo DM per Scuole e Convegni"**, *Dip. di Matematica Tullio Levi-Civita*, Univ. di Padova
- 2003 – 2018 ○ **Member of the "Commissione Didattica del CdS di Ingegneria Gestionale"**, *Dipartimento di Tecnica e Gestione dei sistemi industriali (DTG)*, Univ. di Padova, Sede di Vicenza
- 2014 – 2018 ○ **Member of the "Giunta del Dipartimento di Matematica"**, *Dip. di Matematica Tullio Levi-Civita*, Univ. di Padova, (Director Prof. Marco Ferrante)

- 2024 ○ **Referee and member of the PhD committee of Dr. Giacomo Vecchiato**, *Gran Sasso Science Institute (GSSI), Italy*, Feb. 8, 2024, online
- 2021 ○ **Member of the RTD B evaluation committee**, ai sensi dell'art. 24, comma 3, lett. b) della legge n. 240/2010, Decreto MUR n. 856/2020, bandita con D.R. n. 111/21, Settore scientifico-disciplinare MAT/05, Gran Sasso Science Institute (GSSI)
- 2008 ○ **Member of the RU evaluation committee**, *Valutazione Comparativa delle candidature per la copertura di n. 1 posto di Ricercatore Universitario, Settore scientifico-disciplinare MAT/05*, bandita con D.R. N. 1808 del 4.7.2008 e pubblicata in GU n. 55 del 15.7.2008, Univ. di Padova
- 2007 ○ **Member of the RU evaluation committee**, *Valutazione Comparativa delle candidature per la copertura mediante trasferimento di n. 2 posti di Ricercatore Universitario, Settore scientifico-disciplinare MAT/05*, pubblicata sulla G.U. n. 23 del 20/03/2007, Facoltà di Ingegneria dell'Università degli Studi di Roma "Tor Vergata"
- 2005 ○ **Member of the Associate Professor evaluation committee**, *Valutazione Comparativa delle candidature per la copertura di n. 1 posto di Professore Associato, Settore scientifico-disciplinare MAT/05*, pubblicata nel supplemento della G.U., 4a serie speciale, n. 37 del 10/05/2005, Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università di Palermo