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Roberto Guglielmi

CURRICULUM VITAE

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	GUGLIELMI
NOME	ROBERTO
DATA DI NASCITA	25 MARZO 1985

INSERIRE IL PROPRIO CURRICULUM (non eccedente le 30 pagine)

Institution

Gran Sasso Science Institute - GSSI

Email: roberto.guglielmi@gssi.it

Personal

Birth: March 25, 1985 in Bari, Italy. Nationality: Italian. Gender: Male

Mother tongue: Italian. Other languages: English: advanced. French: advanced.

Spanish: advanced. German: intermediate.

Education

- October 2010 - July 2013: PhD in Applied Mathematics at the University of Lorraine, France, advisor Prof. F. Alabau-Boussouira. Thesis in joint supervision with the University of Rome Tor Vergata, Italy.
- November 2009 - May 2013: PhD in Mathematics at the University of Rome Tor Vergata, Italy, advisor Prof. P. Cannarsa. Thesis in joint supervision with the University of Lorraine, France.
Thesis title: Stabilization and control of partial differential equations of evolution.
- October 2007 - July 2009: master's degree in Mathematics at the University of Bari, Italy (with an Erasmus semester at the Eberhard Karls Universität Tübingen, Germany).
- September 2004 - October 2007: bachelor's degree in Mathematics at the University of Bari, Italy.

Experience

- Since November 2017: Research fellow at the Gran Sasso Science Institute, L'Aquila, Italy.
- April - October 2017: Researcher and data scientist at the Dyrecta Lab Research Institute, Bari, Italy.

- February 2015 - January 2017 (24 months): Research assistant at the Radon Institute for Computational and Applied Mathematics (RICAM) in Linz, Austria, part of the Austrian Academy of Science (ÖAW). Member of the research group on Optimization and Optimal Control, scientific director Prof. K. Kunisch.
- January 2015: short research stay at the Universidad Tecnica Federico Santa Maria de Valparaiso, Chile, invited by Prof. A. Mercado and Prof. E. Cerpa.
- November - December 2014: short research stay at the Henri Poincaré Institute in Paris, France, attending the thematic trimester on "Geometry, Analysis and Dynamics on Sub-Riemannian Manifolds".
- June 2013 - November 2014 (18 months): Marie Curie fellow between the Chair of Applied Mathematics of the University of Bayreuth, Germany (for 12 months), and the Department of Electrical and Electronic Engineering at the Imperial College London, UK (for 6 months), within the EU Initial Training Network FP7-PEOPLE-2010-ITN, grant agreement 264735-SADCO.

Research

Fields of Research Interest

My research interests address a wide range of problems in control, optimization and stability theory of dynamical systems, expressed by (linear and nonlinear) ordinary/partial differential equations. In particular, I am interested in

- Turnpike behavior of dissipative systems;
- Bilinear optimal control of parabolic equations, with application to stochastic optimal control;
- Model predictive control schemes for partial differential equations;
- Controllability of (possibly degenerate/singular) parabolic equations;
- Identification and determination of coefficients for reaction-diffusion equations;
- Sensitivity analysis for optimal control of infinite dimensional dynamical systems;
- Stabilization of systems of hyperbolic equations.

Moreover, I have a strong interest towards the application of control and optimization theory to the foundation of machine learning techniques, and in particular to reinforcement learning algorithms.

Distinctions

My PhD thesis has been awarded with the prize "Premio Rendiconti di Matematica 2013", appointed by the Journal Rendiconti di Matematica, for the best PhD thesis in Mathematics defended at Italian universities in the period from 1/1/2012 to 31/5/2013.

<http://www.mat.uniroma1.it/archivionotizie/bando-premio-rendiconti-di-matematica-2013>

Projects

I have been involved in the following projects:

- Since 2018, French-Italian-German Laboratoire International Associé (LIA) on Applied Mathematics, Control of PDE and Scientific Computing (COPDESC), cofunded by CNRS (France), INdAM (Italy), and Max Planck Gesellschaft (Germany).
- GDRE ConEDP (Control of Partial Differential Equations) 2010-2013, cofunded by CNRS (France) and INdAM (Italy), <https://www.ceremade.dauphine.fr/~glass/GDRE> ; The project has been further extended for the period 2014-2017.
- FP7-PEOPLE-2010-ITN SADCO (Sensitivity Analysis for Deterministic Control Design), funded by the EU, 2011-2014, <http://itn-sadco.inria.fr> ;
- Yearly GNAMPA Research Projects, funded by INdAM, from 2012 to 2019.

Organization activities

Organizer, together with A. Festa, A. Marigonda and M. Palladino, of the meeting on "Control Theory and Applications" at the GSSI, L'Aquila, Italy, 28-29 March 2019.

Organizer, together with G. Floridia and C. Pignotti, of the conference "Analysis, Control and Inverse Problems for PDEs" at the Accademia Pontaniana in Napoli, Italy, 26-30 November 2018.

Organizer, together with P. Cannarsa, of the meeting on "New trends in control of evolution systems" at the GSSI, L'Aquila, Italy, 20-21 April 2018.

Organizer, together with P. Cannarsa, of the thematic day on "New developments on Hamilton-Jacobi Equations, Mean Field Games, and Weak KAM Theory" at the GSSI, L'Aquila, Italy, March 2, 2018.

Organizer, together with D. Prandi, of the thematic session "On some aspects of null controllability (or lack thereof) of Grushin operators", during the VII conference on "Partial differential equations, optimal design and numerics", Aug 20 - Sep 01 2017, in Benasque, Spain.

Organizer, together with M. Palladino and J. Sprekels, of the Young Researchers Workshop, held at the Weierstrass Institut for Applied Analysis and Stochastics (WIAS) in Berlin, Germany, 29-31 January 2014. http://uma.ensta-paristech.fr/itn-sadco/?module=berlin_2014&action=index

From June 2013 until November 2014, delegate of the fellows involved in the ITN-SADCO project, together with M. Palladino.

Organizer, together with P. Cannarsa, of the working group on "Control theory for PDEs" at the University of Rome Tor Vergata, during the period March - July 2012.

Institutional activities

PhD thesis committee member (Mathematics) at the Gran Sasso Science Institute - GSSI, L'Aquila, November 2018, Student: Andrea Mazzon.

PhD thesis committee member (Mathematics) at the Gran Sasso Science Institute - GSSI, L'Aquila, July 2018, Student: Giancarlo Nino.

Teaching

In February 2019 I held a PhD course for the PhD program in Mathematics of the University of L'Aquila, on Control of linear hyperbolic PDEs, 6 hours.

During November 2017 - February 2018, tutor for the PhD class on PDEs in the PhD program in Mathematics at the GSSI, course held by Prof. Marcati, 20 hours.

During March - June 2011, tutor at the University of Rome Tor Vergata, for 60 hours in total, for the following courses:

- Mathematical Analysis IV for the bachelor in Mathematics, course held by Prof. Cannarsa;
- Introduction to Functional Analysis for the master in Mathematics, course held by Prof. Cannarsa;
- Analysis II for the bachelor in Applied Chemistry, course held by Prof. Caprino.

Reviewing activity

I serve as reviewer for the following journals: SIAM Journal on Control and Optimization; Journal of Differential Equations; IEEE Transactions on Automatic Control; Control, Optimisation and Calculus of Variations; Nonlinear Analysis; Nonlinearity; Numerical Algorithms; Optimal Control, Applications and Methods; Mathematical Methods in the Applied Sciences; Journal of Dynamical and Control Systems; Nonlinear Differential Equations and Applications; IFAC Workshop on Control of Systems Governed by Partial Differential Equations; Applied Mathematical Modelling; Mathematical Control and Related Fields.

Short research stays

- March 2017: research stay at the University Tor Vergata of Rome, Italy, invited by Prof. P. Cannarsa.

- January 2015: Visiting Prof. A. Mercado and Prof. E. Cerpa at the Universidad Tecnica Federico Santa Maria de Valparaiso, Chile.

- November - December 2014, six weeks: Thematic trimester on "Geometry, Analysis and Dynamics on Sub-Riemannian Manifolds" at the Henri Poincaré Institute in Paris, France.

- July-August 2014, six weeks: Visiting Prof. A. Mercado and Prof. E. Cerpa at the Universidad Tecnica Federico Santa Maria de Valparaiso, Chile.
- March 2014, two weeks: Visiting Prof. M. Yamamoto at the University of Tokyo, Japan.
- April 2013, one week: Visiting Dr. G. Mola at University of Milano, Italy.
- February 2013: "Research in Paris" project together with Dr. G. Mola, at the Henri Poincaré Institute in Paris, France.
- November 2012, three weeks: Visiting Prof. M. Cristofol at the University Aix-en-Provence of Marseille, France.
- October 2012, October 2011 - February 2012 and September 2010: periods at the University of Lorraine in Metz, France, visiting Prof. F. Alabau-Boussouira.
- October - December 2010: Thematic trimester on "Control of PDEs and Applications" at the Henri Poincaré Institute in Paris, France.

Talks

I have had the chance to present my research results during several scientific meetings.

Invited talks

- July 2019: Workshop on "New trends in Hamilton-Jacobi: PDE, Control, Dynamical Systems and Geometry" at the Fudan University, Shanghai, China.
- June 2019: Intensive INdAM Trimester on "Shape optimization, control and inverse problems for PDEs" at the University of Naples, Italy.
- June 2019: Workshop on "Functional Analytic Methods for PDEs" in Cesena, Italy.
- February 2019: at the ICMC Summer Meeting on Differential Equations - Chapter 2019, Special session on Evolution Equations and Applications, in São Carlos, Brasil.
- September 2018: first joint meeting of the Italian Mathematical Union, the Italian Society of Industrial and Applied Mathematics and the Polish Mathematical Society in Wroclaw, Poland, in the session "Operator Semigroups: New Challenges and Applications".
- July 2018: 14th Viennese Conference on "Optimal Control and Dynamic Games" in Vienna, Austria, in the Special Session on "Turnpike properties for ODEs and PDEs: theory and applications".
- July 2017: "New Trends in Control Theory and PDEs" at INdAM Institute, Rome, Italy.
- July 2016: "Workshop on Hamilton-Jacobi Equations" at the Fudan University, Shanghai, China.
- June 2016: "2nd IFAC Workshop on Control of Systems Governed by Partial Differential Equations", invited session on "Control and Numerics of the Fokker-Planck Equation", Bertinoro, Italy.
- July 2015: "New advances in PDEs, Inverse Problems and Control Theory" in Parma, Italy.
- Septembre 2014: "PDEs, Inverse Problems and Control Theory" in Bologna, Italy.
- July 2014: 21st International Symposium on Mathematical Theory of Networks and Systems, in Groningen, Netherlands, in the Session on Distributed Parameter Systems II.
- March 2014: "Diffusion in Heterogeneous Media and Related Topics" in Tokyo, Japan.
- June 2013: "PDEs, Inverse Problems and Control Theory" in Cortona, Italy.
- November 2012: "Control of PDEs, interactions and application challenges" in Marseille, France.
- July 2012: "PDEs, Inverse Problems and Control Theory" in Bologna, Italy.
- September 2011: 25th IFIP Conference on "System Modeling and Optimization" in Berlin, Germany, in the MS9 "Analysis and Control of Composite PDE Systems: New Challenges and Methods I-V".

Contributed talks

- September 2018: VI Latin American Workshop on Optimization and Control in Quito, Ecuador.
- March 2018: 7th International Conference on "High Performance Scientific Computing" in Hanoi, Vietnam.
- August 2017: "PDEs, Optimal Design and Numerics" at the Benasque International Center of Science, Benasque, Spain.
- June 2016: INdAM Meeting OCERTO 2016 on "Optimal Control for Evolutionary PDEs and Related Topics", Cortona, Italy.

- March 2016: "Numerical Methods for Optimal Control and Inverse Problems" at the Technical University of Munich, Germany.
- January 2015: "Control Systems and Identification Problems" at the Universidad Tecnica Federico Santa Maria de Valparaiso, Chile.
- November 2014: Internal Review Meeting of the SADCO project, conference "New Perspectives in Optimal Control and Games", at the Sapienza University of Rome, Italy;
- May 2014: "SIAM Optimization" in the CP7 on Optimal Control, in San Diego, US;
- September 2013: "PDEs, Optimal Design and Numerics 2013" at the Benasque International Center of Science, Benasque, Spain.
- June 2013: "Doctoral Days SADCO 2013" in Paris, France.
- September 2011: XIX UMI Conference in Bologna, Italy.
- September 2011: "PDEs, Optimal Design and Numerics" at the Benasque International Center of Science, Benasque, Spain.

Department seminars

- July 2019: at the seminar of the Department of Mechanics, Management and Mathematics of the Technical University of Bari, Italy.
- April 2019: at the seminar of the Department of Statistics and Operations Research of the University of Vienna, Austria.
- January 2019: at the Analysis and PDEs seminar of the Universidade Federal do Rio de Janeiro, Brasil.
- June 2018: at the Oberseminar of the department of applied mathematics of the University of Bayreuth, Germany.
- October 2017: at the conference on "Comportamento asintotico e controllo di equazioni di evoluzione non lineari", at the Department of Mathematics of the University of Florence, Italy.
- March 2016: at the "Séminaires Equations aux Dérivées Partielles" of the Department of Mathematics of the University of Besançon, France.
- May 2015: at the Oberseminar of the Department of Applied Mathematics of the University of Bayreuth, Germany.
- May 2015: "Séminaires Statistiques Probabilités Optimisation et Contrôles" of the Department of Applied Mathematics of the University of Dijon, France.
- October 2014: in the seminar of the Department of Electrical and Electronic Engineering at the Imperial College London, UK.
- August 2014: in the "Seminario de Control y Problemas Inversos en EDPs" at the Universidad Tecnica Federico Santa Maria de Valparaiso, Chile.
- July 2013: at the Oberseminar of the department of applied mathematics of the University of Bayreuth, Germany.

Programming skills

Matlab, Python, LATEX, Office.

List of Publications of Roberto Guglielmi

Papers

- Guglielmi R., Kunisch K., Sensitivity analysis for the value function of a semilinear parabolic equation and its relation to Riccati equations, Optimization, 67(6), 1-24, 2018.
- Grüne L., Guglielmi R., Turnpike properties and strict dissipativity for discrete time linear quadratic optimal control problems, SIAM J. Control Optim. (SICON), 56(2), 1282-1302, 2018.
- Fleig A. and Guglielmi R., Optimal Control of the Fokker-Planck Equation with Space-Dependent Controls, Journal of Optimization Theory and Applications (JOTA), 408-427, (174), 2017.
- Guglielmi R., Indirect stabilization of hyperbolic systems through resolvent estimates, Evolution Equations and Control Theory (EECT), 59-75, 6(1), 2017;
- Beauchard K., Cannarsa P., Guglielmi R., Null controllability of Grushin-type operators in dimension two, Journal of European Mathematical Society (JEMS), 67-101 (16) 2014;

- Cannarsa P., Guglielmi R., Null controllability in large time for the parabolic Grushin operator with singular potential, in G. Stefani, U. Boscain, J.-P. Gauthier, A. Sarychev, M. Sigalotti(eds.): Geometric Control Theory and sub-Riemannian Geometry, Springer INdAM Series 5, 87-102, 2013;
- Guglielmi R., Stabilization and control of partial differential equations of evolution, Rend. Mat. Appl., VII. Ser. 33, No. 3-4, 83-222, 2013;
- Alabau-Boussouira F., Cannarsa P., Guglielmi R., Indirect stabilization of weakly coupled systems with hybrid boundary conditions, Mathematical Control and Related Fields (MCRF), 413-436 (4) 2011.

Chapter contributions

- Contributor for the Chapter Hamilton-Jacobi-Bellman Equations, pages 127-261, of the book Optimal Control: Novel Directions and Applications, Tonon, Daniela, Aronna, Maria Soledad, Kalise, Dante (Eds.), Lecture Notes in Mathematics, Springer International Publishing (2017).

Conference Proceedings

- Fleig A., Guglielmi R., Bilinear Optimal Control of the Fokker-Planck Equation, Proceedings of the 2nd IFAC Workshop on Control of Systems Governed by Partial Differential Equations (CPDE), Bertinoro, Italy, 2016.
- Fleig A., Grüne L. and Guglielmi R., Some results on Model Predictive Control for the Fokker-Planck equation, in Proceedings of the 21st International Symposium on Mathematical Theory of Networks and Systems (MTNS 2014), 2014, 1203-1206.

Data

02/08/19

Luogo

L'Aquila