

# ALESSANDRO ALLA

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## RESEARCH INTERESTS

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Scientific Computing, Numerical Analysis, Machine Learning, Data-Driven modeling, Numerical Optimization, Optimization with PDE constraints, Open-Loop Control, Closed-Loop Control, Model Predictive Control, Hamilton–Jacobi–Bellman equations, Reduced Order Modeling, Proper Orthogonal Decomposition, Dynamic Mode Decomposition.

## EMPLOYMENT

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**Università Ca' Foscari di Venezia, Italy.** *November 2021 – present*  
Senior Researcher (RTDb) in the Department of Molecular Sciences and Nanosystems.

**Pontifical Catholic University (PUC-Rio), Brazil.** *March 2021 – October 2021*  
Professor Adjunct II (tenured) in the Department of Mathematics.

**Pontifical Catholic University (PUC-Rio), Brazil.** *August 2017 – February 2021*  
Professor Adjunct I (tenure-Track) in the Department of Mathematics.

**Florida State University, USA.** *February 2016 – July 2017*  
PostDoctoral Researcher in the group of Prof. Max Gunzburger.

**University of Hamburg, Germany.** *February 2014 – January 2016*  
PostDoctoral Researcher in the group of Prof. Michael Hinze

## EDUCATION

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**Sapienza, University of Rome, Italy.** *November 2010 – January 2014*  
Ph.D. in Applied Mathematics.  
Advisor: Prof. Maurizio Falcone.  
Thesis: *Model Reduction for a Dynamic Programming Approach to Optimal Control Problems with PDE Constraints.*  
Committee: Prof. Elisabetta Carlini, Prof. Michael Hinze, Prof. Gianluigi Rozza.

**Sapienza, University of Rome, Italy.** *September 2007 – December 2009*  
M.Sc. in Applied Mathematics  
Advisor: Prof. Maurizio Falcone.  
Final Evaluation: 110/110 (on 5 year average).

**Sapienza, University of Rome, Italy.** *September 2004 – September 2007*  
B.Sc. in Mathematics.

## PUBLICATIONS, CONFERENCE PROCEEDINGS, PREPRINTS, THESES

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### Peer Reviewed Publications

1. A. Alla, H. Oliveira, G. Santin, *HJB-RBF based approach for the control of PDEs*, Journal of Scientific Computing, **96**, 2023, 1-27. <https://doi.org/10.1007/s10915-023-02208-3>
2. A. Alla, M. D'Elia, C. Glusa, H. Oliveira, *Control of fractional diffusion problems via dynamic programming equations*, Journal of Peridynamics and Nonlocal Modeling, 2023. <https://doi.org/10.1007/s42102-023-00101-z>

3. A. Alla, A. Monti, I. Sgura, *Adaptive POD-DEIM correction for Turing pattern approximation in reaction-diffusion PDE systems*, Journal of Numerical Mathematics, **31**, 2023, 205–229. <https://doi.org/10.1515/jnma-2022-0025>
4. A. Alla, D. Kalise, V. Simoncini, *State-dependent Riccati equation feedback stabilization for nonlinear PDEs*, Advances in Computational Mathematics, **49**, 2023, 1-32. <https://doi.org/10.1007/s10444-022-09998-4>
5. L. Saluzzi, A. Alla, M. Falcone, *Error estimates for a tree structure algorithm solving finite horizon control problems*, ESAIM: COCV, **28**, 2022, 69. <https://doi.org/10.1051/cocv/2022067>
6. A. Alla, C. Graessle, M. Hinze, *Time adaptivity in Model Predictive Control*, Journal of Scientific Computing, **90**, 2022, 1-24. <https://doi.org/10.1007/s10915-021-01647-0>
7. A. Alla, M. Falcone, L. Saluzzi, *A tree structure algorithm for optimal control with state constraints*, Rendiconti di Matematica e delle sue Applicazioni, **41**, 2020, 193-221.
8. A. Alla, C. Balzotti, M. Briani, E. Cristiani, *Understanding Mass Transfer Directions via Data-Driven Models with Application to Mobile Phone Data*, SIAM J. Appl. Dyn. Syst., **19**, 2020, 1372–1391. <https://doi.org/10.1137/19M1248479>
9. A. Alla, B. Haasdonk, A. Schmidt, *Feedback control of parametrized PDEs via model order reduction and dynamic programming principle*, Advances in Computational Mathematics, **46**, 2020. <https://doi.org/10.1007/s10444-020-09744-8>
10. A. Alla, L. Saluzzi, *A HJB-POD approach for the control of nonlinear PDEs on a tree structure*, Applied Numerical Mathematics, **155**, 2020, 192-207. <https://doi.org/10.1016/j.apnum.2019.11.023>
11. A. Alla, M. Falcone, L. Saluzzi, *An efficient DP algorithm on a tree-structure for finite horizon optimal control problems*, SIAM J. Sci. Comput., **41**, 2019, A2384-A2406. <https://doi.org/10.1137/18M1203900>
12. M. Hess, A. Alla, A. Quaini, G. Rozza, M. Gunzburger. *A localized reduced-order modeling approach for PDEs with bifurcating solutions*, Computer Methods in Applied Mechanics and Engineering, **311**, 2019, 379-403. <https://doi.org/10.1016/j.cma.2019.03.050>
13. S. Rudy, A. Alla, S. Brunton, J.N. Kutz, *Data-driven identification of parametric partial differential equations*, SIAM J. Appl. Dyn. Syst., **18**, 2019, 643–660. <https://doi.org/10.1137/18M1191944>
14. A. Alla, J.N. Kutz. *Randomized Model Order Reduction*, Advances in Computational Mathematics, **45**, 2019, 1251-1271. <https://doi.org/10.1007/s10444-018-09655-9>
15. A. Alla, M. Hinze, P. Kolvenbach, O. Lass, S. Ulbrich, *A Certified Model Reduction Approach for Robust Parameter Optimization with PDE Constraints*, in Advances in Computational Mathematics, **45**, 2019, 1221-1250. <https://doi.org/10.1007/s10444-018-9653-1>
16. A. Alla, C. Graessle, M. Hinze. *A-posteriori snapshots location for POD in optimal control of linear parabolic equations*, ESAIM:M2AN, **52**, 2018, 1847-1873. <https://doi.org/10.1051/m2an/2018009>
17. A. Alla, M. Falcone, S. Volkwein. *Error analysis for POD approximations of infinite horizon problems via the dynamic programming approach*, SIAM J. Control Optim., **55**, 2017, 3091-3115. <https://doi.org/10.1137/15M1039596>

18. A. Alla, J.N. Kutz. *Nonlinear model order reduction via Dynamic Mode Decomposition*, SIAM J. Sci. Comput., **39**, 2017, 778-796. <https://doi.org/10.1137/16M1059308>
19. A. Alla, M. Falcone, D. Kalise. *A HJB-POD feedback synthesis approach for wave equation*, Bulletin of the Brazilian Mathematical Society, New Series, **47**, 2016, 51-64. <https://doi.org/10.1007/s00574-016-0121-6>
20. A. Alla, S. Volkwein. *Asymptotic Stability and Suboptimality of Model Predictive Control for semilinear PDEs*, in Advances in Computational Mathematics, Springer US, **41**, 2015, 1073-1102. <https://doi.org/10.1007/s10444-014-9381-0>
21. A. Alla, M. Falcone, D. Kalise. *An efficient Policy Iteration algorithm for dynamic programming equations*, SIAM J. Sci. Comput., **37**, 2015, 181-200. <https://doi.org/10.1137/130932284>

### Submitted Papers

22. A. Alla, A. Monti, I. Sgura, *Piecewise DMD for oscillatory and Turing spatio-temporal dynamics*, submitted to Computers&Mathematics with applications. <https://arxiv.org/abs/2303.06512>
23. A. Alla, A. Pacifico, A. Pesare, M. Palladino, *Online identification and control of PDEs via Reinforcement Learning methods*, submitted to Advances in Computational Mathematics. <https://arxiv.org/abs/2308.04068>

### Peer Reviewed Conference Proceedings

24. A. Alla, L. Saluzzi, *Feedback reconstruction techniques for optimal control problems on a tree structure*, in Eccomas 2022
25. A. Alla, P.M. Dower, V. Liu, *A tree structure approach to reachability analysis*, In: Albi, G., Boscheri, W., Zanella, M. (eds) Advances in Numerical Methods for Hyperbolic Balance Laws and Related Problems. YR 2021. SEMA SIMAI Springer Series, vol 32. Springer, Cham. [https://doi.org/10.1007/978-3-031-29875-2\\_1](https://doi.org/10.1007/978-3-031-29875-2_1)
26. A. Alla, M. Falcone, L. Saluzzi, *High-order Approximation of the Finite Horizon Control Problem via a Tree Structure Algorithm*, in IFAC-PapersOnLine, **52**, 2019, 19-24.
27. A. Alla, V. Simoncini, *Order reduction approaches for the algebraic Riccati equation and the LQR problem*, In: Falcone M., Ferretti R., Grüne L., McEneaney W. (eds) Numerical Methods for Optimal Control Problems. Springer INdAM Series, **29**. Springer, Cham, 2019, 89-109.
28. J.N. Kutz, S. Rudy, A. Alla, S. Brunton *Data-driven discovery of governing physical laws and their parametric dependencies in engineering, physics and biology*, to appear in Conference Proceedings CAMSAP 2017.
29. A. Alla, G. Fabrini, M. Falcone. *A HJB-POD approach to the control of the level set equation*, In Benner P., Ohlberger M., Patera A., Rozza G., Urban K. (eds) Model Reduction of Parametrized Systems. MS&A (Modeling, Simulation and Applications), **17**. Springer, Cham, 2017, 317-331.
30. A. Alla, A. Schmidt, B. Haasdonk. *Model order reduction approaches for infinite horizon optimal control problems via the HJB equation*, In: Benner P., Ohlberger M., Patera A., Rozza G., Urban K. (eds) Model Reduction of Parametrized Systems. MS&A (Modeling, Simulation and Applications), **17**. Springer, Cham, 2017, 333-347.

31. A. Alla, U. Matthes. *Model order reduction for a linearized robust PDE constrained optimization*, in Conference Proceedings of the 2nd IFAC Conference on Control of Partial Differential Equations, **49**, 2016, 321-326.
32. A. Alla, C. Graessle, M. Hinze. *A residual based snapshot location strategy for POD in distributed optimal control of linear parabolic equations*, in Conference Proceedings of the 2nd Conference on Control of Partial Differential Equations, **49**, 2016, 13-18.
33. A. Alla, G. Fabrini, M. Falcone. *Coupling MPC and DP methods for an efficient solution of optimal control problems*, in System Modeling and Optimization, 27th IFIP TC 7 Conference, CSMO 2015, 68-77.
34. A. Alla, M. Hinze. *HJB-POD feedback control of advection-diffusion equation with a model predictive control snapshot sampling*, in Conference Proceedings of the 5th IFAC Conference on Nonlinear Model Predictive Control, **48**, 2015, 527-532.
35. A. Alla, M. Hinze, O. Lass, S. Ulbrich. *Model order reduction approaches for the optimal design of permanent magnets in electro-magnetic machines*, in Conference Proceedings MATHMOD **48**, 2015, 242-247.
36. A. Alla, M. Hinze. *HJB-POD feedback control for Navier-Stokes equations*, in Russo G., Capasso V., Nicosia G., Romano V. (eds) Progress in Industrial Mathematics at ECMI 2014. ECMI 2014. Mathematics in Industry, **22**. Springer, Cham, 2017, 861-868.
37. A. Alla, M. Falcone, D. Kalise. *An accelerated value/policy iteration scheme for the solution of DP equations*, Numerical Mathematics and Advanced Applications - ENUMATH 2013, LNCSE **103**, 2015, 489-497.
38. A. Alla, M. Falcone, D. Kalise. *An efficient Policy Iteration algorithm for dynamic programming equations*, PAMM, **37**, 2013, 467-468.
39. A. Alla, M. Falcone. *A time adaptive POD method for optimal control problems*, in Conference Proceedings of the 1st IFAC Conference on Control of Systems Governed by Partial Differential Equations, **1**, 2013, 245-250.
40. A. Alla, M. Falcone. *An adaptive POD approximation method for the control of advection-diffusion equations*, in Control and Optimization with PDE Constraints, K. Kunisch, K. Bredies, C. Clason, G. von Winckel (eds), International Series of Numerical Mathematics, **164**, Birkhäuser, Basel, 2013, 1-17.

### Lecture Notes

41. A. Alla. *First Steps into Model Order Reduction*, Editora do IMPA, Rio de Janeiro, 2022. <https://impa.br/wp-content/uploads/2022/03/33CBM12-eBook.pdf>

### Phd Thesis

42. A. Alla. *Model Reduction for a Dynamic Programming Approach to optimal control problems with PDE constraints*, PhD Thesis, 2014.

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## SUMMARY OF SCIENTIFIC ACHIEVEMENTS

Papers (international): 36 (source Scopus)

Books (teaching): 1 (<https://impa.br/wp-content/uploads/2022/03/33CBM12-eBook.pdf>)

Total Impact Factor: 46,016 (source: wos valore impact factor)  
Average Impact Factor: 2,4 (source: wos valore impact factor)  
Total Citations: 515 (source Scopus)  
Average Citations per Product: 14,2 (source Scopus)  
Hirsh index: 11  
Normalized H index: 1.22 (H index divided by the academic seniority - source: Scopus)

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## SOCIETY MEMBERSHIPS, AWARDS AND HONORS

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**GNCS.** Member of the National Group of Scientific Computing (GNCS) for the following years: 2013, 2014, 2015, 2022 and 2023.

**ICIAM 2023.** Financial support to attend the conference.

**GNCS Partecipazione a Convegni, Scuole, Workshop e Seminari anno 2023.** Financial support to attend the conference

**Overseas Mobility Program.** Financed by Università Ca' Foscari Venezia.

**Research Awards Young Investigator Training Programm.** Financed by Associazione di Fondazioni e Casse di Risparmio S.p.A, 2021.

**Jovem Cientista de Nosso Estado.** Research grant from FAPERJ, 2021-2024. (PI Alessandro Alla)

**National Scientific Habilitation.** Italian habilitation to the role of Associate professor. Valid from the 09/11/2020 till 09/11/2029.

**Bolsas de Produtividade em Pesquisa.** Research grant from CNPq, 2019-2022. (PI Alessandro Alla)

**Bolsa PUC de Produtividade em Pesquisa.** Research grant from PUC-Rio, 2018-2022. (PI Alessandro Alla)

**Brazilian-French Network in Mathematics.** Financial Support for a research visit of Dr. Adriano Festa at PUC-Rio, 2018.

**IMPA, Rio de Janeiro, Brazil.** Financial support to attend the conference HYP2014, 2014.

**European Science Foundation (ESF).** Stipend for a three-month long research visit at the University of Konstanz, Germany. Grant n. 4160, 2013.

**University of Seville.** Stipend for a four-month research visit at the University of Seville, Spain, 2010.

**Sapienza, University of Rome, Italy.** Fellowship *Master's thesis abroad*. Stipend for a two-month research visit at Karl Franzens University of Graz, Austria, 2009.

**European Region Action Scheme for the Mobility of University Students.** Erasmus stipend exchange student for a six-month visit at Karl Franzens University of Graz, Austria, 2008.

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**FUNDING INFORMATION**

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**Principal Investigator: Alessandro Alla**

**PRIN PNRR 2022.** *Data-driven discovery and control of multi-scale interacting artificial agent systems.* (PI Prof. Giacomo Albi, local PI in Venice: Prof. Alessandro Alla)

**Jovem Cientista de Nosso Estado, FAPERJ.** *Análise numérica em controle ótimo para equações diferenciais parciais* (PI Prof. Alessandro Alla)

**Bolsa de Produtividade, CNPq.** *Modelagem com redução de ordem em controle ótimo* (PI Prof. Alessandro Alla)

**Bolsa de Produtividade, PUC** *Análise numérica em controle ótimo para equações diferenciais parciais* (PI Prof. Alessandro Alla)

**Investigator: Alessandro Alla**

**Petrobras.** *Mathematical and computational modeling of related problems on injectivity tests in vertical and horizontal wells considering multilayers reservoirs* (PI Prof. Sinesio Pesco)

**Department of Energy DiaMonD:** *An Integrated Multifaceted Approach to Mathematics at the Interfaces of Data, Models, and Decisions* (PI Prof. Max Gunzburger)

**BMBF SIMUROM** (PI Prof. Sebastian Schöps)

**Progetto Ateneo 2010.** *Analisi ed approssimazione di modelli differenziali nonlineari in fluidodinamica e scienza dei materiali* (PI Prof. Maurizio Falcone)

**PRIN 2009.** *Numerical modelling for scientific computing and advanced applications* (PI Prof. Alfio Quarteroni)

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**STUDENT SUPERVISION**

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**PhD Student**

- Agnese Pacifico, (PhD in Mathematics, Sapienza, Università di Roma). *Identification and control of PDEs via Reinforcement Learning methods*, ongoing.
- Angela Monti, (PhD in Mathematics and Informatic, Università del Salento, co-advisor con Prof.ssa Ivonne Sgura). *Model reduction and data-driven techniques for spatio-temporal dynamics of Turing and oscillatory type*, September 2023.
- Hugo Souza Oliveira, (PhD in Mathematics, PUC-Rio, Brazil) *A RBF approach to the control of PDES using Dynamic Programming equations*, September 2022.

**Master Student**

- Iago Arcas da Fonseca. *Applications of heat equation in oil industry*, September 2020.

**Bachelor Student**

- Alessandro Crotti. *Data-driven methods*, ongoing
- Stefano Falcone. *A Semi-Lagrangian scheme for optimal control problem*, October 2023.

**Iniciação Científica**

- Breno Pereira. *FEniCs for nonlinear PDEs*, August 2019.
- Jerônimo Augusto Soares. *Numerical optimization*, August 2020.

**Research in Action**

- Tutoring a group of students of the fourth year from *Liceo Scientifico G.B. Grassi* (Latina, Italy) under the project PCTO.

**ACADEMIC VISITS**


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<b>PUC-Rio, Brazil.</b> Visiting Prof. Carlos Tomei.	February 2023 – March 2023
<b>The University of Melbourne, Australia.</b> Visiting Prof. Peter M. Dower.	September 2022
<b>IAC-CNR, Italy.</b> Visiting Dr. Emiliano Cristiani.	June 2021
<b>The University of Hong Kong, China.</b> Visiting Professor Zheng Qu.	January 2019–February 2019
<b>University of Washington.</b> Visiting Professor J. Nathan Kutz.	April 2017
<b>University of Washington.</b> Visiting Professor J. Nathan Kutz.	April 2016
<b>University of Konstanz, Germany.</b> Visiting Professor Stefan Volkwein.	January 2013 – May 2013
<b>University of Seville, Spain.</b> Post graduate intensive course: <i>Constructive Approximation, Optimization and Mathematical Modelling</i> .	March 2010 – June 2010
<b>Karl Franzens University of Graz, Austria.</b> Visiting Professor Karl Kunisch.	April 2009 – May 2009
<b>Karl Franzens University of Graz, Austria.</b> Erasmus Exchange Project.	February 2009–July 2008

**CONFERENCES, SEMINARS, GIVEN TALKS****Invited Conference Talks**


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ICIAM 2023, Tokyo, Japan <i>Online identification and control of PDEs via Reinforcement Learning methods</i>	August 2023
Nonlinear PDEs: theory, numerics and applications, Rome, Italy <i>Online identification and control of PDEs via Reinforcement Learning methods</i>	May 2023
Theory and numeric of MFG and HJ equations, Rome, Italy <i>HJB-RBF based approach for the control of PDEs</i>	June 2022

- Numerical aspects of hyperbolic laws and related problems, Verona, Italy *December 2021*  
*HJB-RBF based approach for the control of PDEs*
- Simai 2020+2021 (MS ACRI-YITP), Parma, Italy *August 2021*  
*Discovery mathematical models from experimental data*
- Workshop on Optimal Control and Mean Field Games, Rio de Janeiro, Brazil *October 2019*  
*A HJB-POD approach for the control of nonlinear PDEs on a tree structure*
- 3<sup>rd</sup> AFOSR WS Computational Issues in Nonlinear Control, Monterey, USA *October 2019*  
*A Dynamic Programming approach on a tree structure for finite horizon optimal control problems*
- 3<sup>rd</sup> IFAC Workshop on Control of Systems Modeled by PDEs, Oaxaca, Mexico *May 2019*  
*High-order Approximation of the Finite Horizon Control Problem via a Tree Structure Algorithm*
- VI Latin American Workshop on Optimization and Control, Quito, Ecuador *September 2018*  
*Numerical approximation of feedback control for PDEs via Dynamic Programming*
- 14<sup>th</sup> Conference on Optimal Control and Dynamic Games, Vienna, Austria *July 2018*  
*Basis generation for feedback control problems*
- Data-Driven methods for Multi-Scale Physics and Complex Systems, Rome, Italy *August 2017*  
*DMD-Galerkin Approximation for nonlinear dynamical system*
- SIAM Conference on Computational Science, Atlanta, USA *March 2017*  
*Nonlinear Model Order Reduction via Dynamic Mode Decomposition*
- Data-Driven Methods for ROM and Stochastic PDEs, Banff, Canada. *January 2017*  
*Randomized Model Order Reduction.*
- Optimal Control of Partial and Ordinary Differential Equations, Paris, France. *November 2015*  
*Optimal snapshot location for POD model reduction in optimal control.*
- SIAM Conference on Control and its Applications, Paris, France. *July 2015*  
*A POD-MOR approach for robust optimal control with PDE constraints.*
- From Open Loop to Closed Loop control, Graz, Austria. *June 2015*  
*On the stabilization of feedback controls in a dynamic programming framework.*
- SIAM Conference on Computational Science, Salt Lake City, USA. *March 2015*  
*HJB-POD feedback control for advection-diffusion equations.*
- Mathmod, Vienna, Austria. *February 2015*  
*Model order reduction approaches for the optimal design of permanent magnets in electro-magnetic machines.*
- 18th European Conference on Mathematics for Industry (ECMI), Taormina, Italy. *June 2014*  
*HJB-POD feedback control for Navier-Stokes equations.*
- 1st IFAC Workshop on Control of Systems Modeled by PDEs, Paris, France. *September 2013*  
*A Time-Adaptive POD Method for the Optimal Control Problems.*
- Modeling and Control of Large Interacting Dynamical Systems, Paris, France. *September 2013*  
*Asymptotic Stability and Suboptimality of Model Predictive Control for Semilinear PDEs.*
- Model Reduction and Approximation for Complex Systems, Luminy, France. *June 2013*  
*Asymptotic Stability and Suboptimality of Model Predictive Control for Semilinear PDEs.*



### Contributed Conference Talks

- Numerical methods for OCPs: algorithms, analysis and applications, Rome, Italy. June 2017  
*Model order reduction for the control of parametrized PDEs via dynamic programming.*
- 4th Workshop on Sparse Grids and Applications, Miami, USA. October 2016  
*Nonlinear Model Reduction via Dynamic Mode Decomposition.*
- 2nd IFAC Workshop on Control of Systems Governed by PDEs, Bertinoro, Italy. June 2016  
*Model order reduction for a linearized robust PDE constrained optimization.*
- 36th NoKo, Bremen, Germany. April 2015  
*On the coupling between MPC and DP methods for optimal control problems.*
- XV International Conference on Hyperbolic Problems, Rio De Janeiro, Brazil. July 2014  
*HJB-POD feedback control for Navier-Stokes equations.*
- Recent trends in Computational Science and Engineering, Plön, Germany. March 2014  
*HJB-POD feedback control for Navier-Stokes equations.*
- 84th GAMM Annual Meeting, Novi Sad, Serbia. March 2013  
*An adaptive POD approximation method for the control of evolutive equations.*
- Adaptivity and MOR in PDE Constrained Optimization, Hamburg, Germany. July 2012  
*An adaptive POD approximation method for the control of advection-diffusions equation.*
- Summer School on Optimal Control of Partial Differential Equations, Cortona, Italy. July 2010  
*Optimal control problems for PDEs via POD and HJB.*

### Seminars

- Seminarios de engenharia e ciencia computacional, UFRJ, Brazil March 2023  
*Low rank methods for Turing pattern approximation in reaction-diffusion PDE systems*  
 Invited by Prof. Alvaro Coutinho
- Seminari di Analisi Numerica, Università di Bologna, Italy November 2022  
*Low rank methods for Turing pattern approximation in reaction-diffusion PDE systems*  
 Invited by Prof. Valeria Simoncini
- Seminari di Analisi Numerica del Disma, Politecnico di Torino, Italy November 2022  
*Adaptive POD-DEIM correction for Turing pattern approximation in RD-PDE systems*  
 Invited by Prof. Adriano Festa
- ”Differential Equations and Applications”, Università di Padova, Italy. November 2022  
*Recent algorithms towards the control of PDEs via dynamic programming equations*  
 Invited by Prof. Daniela Tonon and Marco Cirant
- CSP Seminar, The university of Melbourne, Australia. September 2022  
*Recent algorithms towards the control of PDEs via dynamic programming equations*  
 Invited by Prof. Peter Dower
- Oberseminar ”Numerical Optimization”, University of Konstanz, Germany May 2022  
*Adaptive POD-DEIM correction for Turing pattern approximation in RD-PDE systems*  
 Invited by Prof. Stefan Volkwein

- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy *December 2021*  
*HJB-RBF based approach for the control of PDEs*  
Invited by Prof. Maurizio Falcone
- Computational Methods in Systems and Control Theory, MPI, 2021. *June 2021*  
*Recent advances in suboptimal feedback control for PDEs*  
Invited by CSC seminar organizers
- Control in Times of Crisis. Online seminar *May 2021*  
*HJB-RBF based approach for the control of PDEs*  
Invited by Luz de Teresa, Sylvain Ervedoza, Enrique Fernández Cara, Alberto Mercado Saucedo
- Palestra - Verão 2021, UFPB, Brazil *March 2021*  
*Análise numérica em controle ótimo para equações diferenciais parciais*  
Invited by Prof. Mauricio Cardoso Santos
- CASA Colloquium, TU Eindhoven, Netherlands *September 2020*  
*A discrete time Dynamic Programming approach on a tree for finite horizon optimal control problems*  
Invited by Prof. Laura Iapichino
- GFDI Colloquium, FSU, USA *April 2019*  
*Discovery mathematical models from experimental data*  
Invited by Prof. Kevin Spear.
- Scientific Computing Colloquium, Department of Scientific Computing, FSU, USA *April 2019*  
*A DP approach on a tree structure for finite horizon optimal control problems*  
Invited by Prof. Bryan Quaife.
- Computational Science Seminar, The University of Hong Kong, China. *January 2019*  
*Discovery mathematical models from experimental data.*  
Invited by Prof. Zheng Qu.
- Computational Science Seminar, The University of Hong Kong, China. *January 2019*  
*A DP approach on a tree structure for finite horizon optimal control problems.*  
Invited by Prof. Zheng Qu.
- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy. *December 2018*  
*Discovery mathematical models from experimental data.*  
Invited by Prof. Maurizio Falcone.
- IMPA, Rio De Janeiro, Brazil *April 2017*  
*Model order reduction for large-scale problem with applications to PDE constrained optimization.*  
Invited by Prof. A. Nachbin.
- PUC-Rio Seminario q.t.p., Rio de Janeiro, Brazil *March 2017*  
*Feedback control for PDEs.*  
Invited by Prof. L. Diaz.
- University of Washington Colloquium, Seattle, USA *April 2017*  
*Model order reduction for the control of PDEs via dynamic programming*  
Invited by Prof. J. Nathan Kutz.

- Scientific Computing Colloquium, FSU, USA. *September 2016*  
*The HJB-POD approach for infinite dimensional control problems.*  
Invited by Prof. Max Gunzburger.
- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy. *February 2016*  
*Nonlinear Model Reduction via Dynamic Mode Decomposition.*  
Invited by Prof. Maurizio Falcone.
- Lothar-Collatz Seminar, Hamburg, Germany. *January 2016*  
*Nonlinear Model Reduction via Dynamic Mode Decomposition.*  
Invited by Lothar-Collatz Center.
- SimTech MOR-Seminar, Stuttgart, Germany. *December 2015*  
*Model order reduction for infinite horizon optimal control problems via the dynamic programming principle.*  
Invited by Prof. Bernard Haasdonk.
- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy. *March 2015*  
*Optimization and Model Reduction for a permanent magnet.*  
Invited by Prof. Maurizio Falcone.
- Group Seminar, RICAM, Linz, Austria. *February 2015*  
*On the coupling between MPC and DP methods for optimal control problems.*  
Invited by Dr. Dante Kalise and Prof. Karl Kunisch.
- Lothar-Collatz Seminar, Hamburg, Germany. *April 2014*  
*Model Reduction for a Dynamic Programming Approach to optimal control problems with PDE constraints.*  
Invited by Lothar-Collatz Center.
- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy. *November 2013*  
*Model Reduction for a Dynamic Programming Approach to optimal control problems with PDE constraints.*  
Invited by Prof. Maurizio Falcone.
- Kolloquium, Constance, Germany. *September 2012*  
*An adaptive POD approximation method for the control of advection-diffusions equation.*  
Invited by Prof. Stefan Volkwein.
- Seminari di Modellistica Numerica, Sapienza University of Rome, Italy. *February 2010*  
*POD Method and reduced order model.*  
Invited by Prof. Maurizio Falcone.

### Poster Session

- MoRePas 2018, Model Reduction of Parametrized Systems IV, Nantes, France. *April 2017*  
*Basis generations for feedback control problems.*
- Optimal Control of Partial and Ordinary Differential Equations, Paris, France. *November 2015*  
*A POD-MOR approach for robust optimal control with PDE constraints.*
- MoRePas 2015, Model Reduction of Parametrized Systems III, Trieste, Italy. *October 2015*  
*A POD-MOR approach for robust optimal control with PDE constraints.*

5th IFAC Conference on Nonlinear Model Predictive Control, Seville, Spain. *September 2015*  
*HJB-POD feedback control of advection-diffusion equation with a Model Predictive Control snapshot sampling.*

New trends on optimal control, Torus, France. *June 2014*  
*MPC initialization for Bellman equations.*

### Scientific Divuligation

Meeting with the students of *Liceo Scientifico G.B. Grassi*, Latina, Italia. *December 2018*  
*La matematica e le sue applicazioni: un mestiere moderno.*

Meeting with the students of *Liceo Scientifico G.B. Grassi*, Latina, Italia. *June 2017*  
*La matematica (non) sarà il mio mestiere.*

Meeting with the students of *Liceo Scientifico G.B. Grassi*, Latina, Italia. *March 2015*  
*Controllo ottimo di equazioni differenziali.*

## TEACHING EXPERIENCE

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**Lecturer** at Summer School SDS2022, Italy. <https://sds2022.wordpress.com/>  
 Model order reduction for ODEs and PDEs and (some) applications. *June 2022*

**Lecturer** at University Ca' Foscari Venezia, Italy.  
 Numerical Methods for Engineering physics. *Fall 2023*

Linear Algebra for Engineering physics. *Fall 2023*

Calculus 0 for for Engineering physics. *Fall 2023*

Calculus 2 for Chemistry. *Fall 2022*

Numerical Methods for Engineering physics. *Fall 2022*

Linear Algebra for Engineering physics. *Fall 2022*

Linear Algebra for Engineering physics. *Spring 2022*

**Lecturer** at IMPA, Rio de Janeiro, Brazil. (PhD course)  
 First steps into model order reduction, 33rd CBM. *August 2021*  
<https://impa.br/publicacoes/coloquios/>

**Lecturer** at Sapienza University of Rome, Italy. (PhD course)  
 Model order reduction for PDEs, Department SBAI. *Fall 2020*

**Lecturer** at The University of Hong Kong, China. (PhD course)  
 Model order reduction for dynamical systems, Department of Mathematics. *Fall 2019*

**Lecturer** at PUC-Rio, Brazil.  
 Calculus 2, Department of Mathematics. *Fall 2021*

Numerical Methods for ODEs, Department of Mathematics. *Fall 2021*

Calculus 2, Department of Mathematics. *Spring 2021*

Numerical Linear Algebra, Department of Mathematics. *Spring 2021*

Calculus 4, Department of Mathematics. *Fall 2020*

Numerical Methods for ODEs, Department of Mathematics. *Fall 2020*

Calculus 4, Department of Mathematics. *Spring 2020*

Numerical Methods for PDEs, Department of Mathematics. *Spring 2020*

Calculus 4, Department of Mathematics. *Fall 2019*

Numerical Methods for ODEs, Department of Mathematics. *Fall 2019*

Numerical Linear Algebra, Department of Mathematics.	<i>Spring 2019</i>
Introduction to Matlab, Department of Mathematics.	<i>Spring 2019</i>
Nonlinear Numerical Analysis, Department of Mathematics.	<i>Fall 2018</i>
Numerical Methods for ODEs, Department of Mathematics.	<i>Fall 2018</i>
Numerical Linear Algebra, Department of Mathematics.	<i>Spring 2018</i>
Introduction to Matlab, Department of Mathematics.	<i>Spring 2018</i>
Topics of Applied Mathematics, Department of Mathematics.	<i>Fall 2017</i>
<b>Teaching Assistant</b> at Florida State University, USA.	
Finite Element, Department of Scientific Computing.	<i>Fall 2016</i>
<b>Lecturer</b> at University of Hamburg, Germany.	
Model Reduction, Department of Mathematics.	<i>Fall 2015</i>
<b>Teaching Assistant</b> at University of Hamburg, Germany.	
Model Reduction, Department of Mathematics.	<i>Fall 2015</i>
Model Reduction, Department of Mathematics.	<i>Fall 2014</i>
<b>Teaching Assistant</b> at Sapienza, University of Rome, Italy.	
Programming and Computing Laboratory, Department of Mathematics.	<i>Fall 2013</i>
Calculus I, Department of Engineering.	<i>Fall 2013</i>
Programming and Computing Laboratory, Department of Mathematics.	<i>Fall 2012</i>
Numerical Analysis, Department of Mathematics.	<i>Spring 2011</i>
Programming and Computing Laboratory, Department of Mathematics.	<i>Fall 2011</i>
Calculus I, Department of Aerospace Engineering.	<i>Fall 2010</i>
Calculus II, Department of Aerospace Engineering.	<i>Fall 2010</i>
Calculus I, Department of Chemistry.	<i>Fall 2010</i>

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## ACADEMIC SERVICE

### Journal Reviewer

Referee for the following journals: Acta Applicandae Mathematicae (ACAP), American Control Conference, Advances in Computational Mathematics, Annual Reviews in Control, CNPq proposal, Computer Methods in Applied Mechanics and Engineering, DFG grant proposal, ESAIM Control, Optimization and Calculus of Variations, IFAC Journals, Journal of Guidance Control and Dynamics, Mathematical Control and Related Fields, Mathematics and Computers in Simulation, Numerische Mathematik, SIAM Journal in Optimization and Control, SIAM Journal on Scientific Computing, Journal of Computational Physics, Journal of Scientific Computing, Communications in Nonlinear Science and Numerical Simulation.

### Department Duties

Member of the "Structuring Teaching Nucleus" in the Department of Mathematics at the Pontifical Catholic University of Rio de Janeiro for the academic years 2019/2020 and 2020/2021.

Member of the "Teaching Staff" for the bachelor course Environmental Engineering for the Ecological Transition at Università Ca' Foscari Venice for the academic year 2023/2024.

### Workshop and Mini Symposium Organizer

Minisymposium organizer for the 2015 SIAM Conference on Control and its Applications, the 2017 SIAM Conference on Computational Science and Engineering, and the 2017 SIAM Conference on Control and its Applications.

Organizer of OktoberMat 2019 and 2020.

Local organizer of Workshop on Optimal Control and mean field games at FGV, Rio de Janeiro, Brazil 2019. <https://sites.google.com/view/control-mfg-rio2019>

Organizer of the workshop *Maurizio day: numerics for controls, pdes and images* scheduled in December 2023 <https://www1.mat.uniroma1.it/ricerca/convegni/2023/Mday/>

Organizer of the Summer School *Machine Learning and Optimal Control* scheduled in May 2024. <https://sites.google.com/view/mloc2024/home>

Organizer of the workshop *New trends in optimal control* scheduled in May 2024. <https://warwick.ac.uk/fac/sci/math/research/events/2023-2024/venicecontrol2024>

Organizer of the workshop *Numerical Analysis in Veneto* scheduled in May 2024.

### COMPUTER SKILLS

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C++, FEniCS, L<sup>A</sup>T<sub>E</sub>X, Linux, Mac OS X, Matlab, Microsoft Windows, OpenOffice.

<https://github.com/alessandroalla/>

### LANGUAGES

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Italian: Native Speaker

English: Fluent

Portuguese: Upper Intermediate

Spanish: Elementary

Padova 01/12/2023

Tutto quanto dichiarato nel presente curriculum vitae corrisponde a verità ai sensi degli articoli 46 e 47 del D.P.R. 445/2000.