Matteo Della Rossa

Age	31	**Email**	matteo.dellarossa@uclouvain.be
Nationality	Italian		

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Education

'11-'15 Bachelor in Mathematics- University of Udine / Italy

'15-'17 Master in Mathematics (110/110 cum laude) - University of Udine / Italy

Thesis's Title: *Esistence And Uniqueness Results in Nonlinear Analysis*
Under the diretion of Prof. *Fabio Zanolin*

'17-'20 Ph. D. in Automatic Control -University of Toulouse, INSA
& Laboratory for Analysis and Architecture of Systems (LAAS-CNRS) / Toulouse, France

Thesis's Title: *Non-Smooth Lyapunov Functions for Stability Analysis of Hybrid Systems*
Under the direction of Dr. *Aneel Tanwani* and Prof. *Luca Zaccarian*

2-months visiting period at Imperial College London, London / UK
Under the direction of Prof. *David Angeli*

Research Papers

Journal (published)

1. Della Rossa, M. and Tanwani, A. and Zaccarian, L. (2020). Max-min Lyapunov functions for switched systems and related differential inclusions. *Automatica*, vol. 120, 109123.
2. Della Rossa, M. and Goebel, R. and Tanwani, A. and Zaccarian, L.(2021). Piecewise structure of Lyapunov functions and densely checked decrease conditions for hybrid systems. *Math. Control Signals Syst.* , vol. 33, pp. 123-149.
3. Della Rossa, M. and Tanwani, A. and Zaccarian, L. (2021). Non-pathological ISS-Lyapunov functions for interconnected differential inclusions. *IEEE Transactions on Automatic Control, vol. 67, no. 8, pp. 3774-3789.*
4. Della Rossa, M. and Tanwani, A. (2022). Instability of dwell-time constrained switched nonlinear systems. *Systems & Control Letters*, vol. 162, 105164.
5. Della Rossa, M. and Pasquini, M. and Angeli, D. (2022). Continuous-time switched systems with switching frequency constraints: Path-complete stability criteria. *Automatica*, vol. 137, 110099.
6. Debauche, V. and Della Rossa, M. and Jungers, R. (2022) Comparison of path-complete Lyapunov functions via template-dependent lifts. *Nonlinear Analysis: Hybrid Systems*, vol. 46, 101237.
7. Della Rossa, M. and Jungers, R. (2023) Interpretability of Path-Complete Techniques and Memory-Based Lyapunov Functions *IEEE Control Systems Letters* , vol. 7, 781 - 786.
8. Della Rossa, M. and Egidio, L. N. and Jungers, R. (2023) Stability of switched affine systems: arbitrary and dwell-time switching *SIAM Journal on Control and Optimization*,Vol. 61, Iss. 4.
9. Nayak S.P. and Egidio, L. N. and Della Rossa M. and Schmuck A.-K. and Jungers, R. (2023) Context-Triggered Abstraction-Based Control Design *IEEE Open Journal of Control Systems*,Vol. 2, pp. 277-296.
10. Della Rossa, M. and Alves Lima, T and Jungers, M. and Jungers, R. (2024). Graph-based conditions for feedback stabilization of switched and LPV systems. *Automatica*, vol. 160, 111427.

Journal (submitted)

1. Della Rossa, M. and Jungers, R. (n.d.) Multiple Lyapunov Functions and Memory: A Symbolic Dynamics Approach to Systems and Control

2. Della Rossa, M. (n.d.) Converse Lyapunov Results for Switched Systems with Lower and Upper Bounds on Switching Intervals

3. Breda, D. and Della Rossa, M. and Freddi, L. (n.d.) Viability and control of a delayed SIR epidemic with an ICU state constraint

International Conferences (published)

1. Della Rossa, M. and Tanwani, A. and Zaccarian, L. (2018). Max-min Lyapunov functions for switching differential inclusions. *IEEE 57th Conference on Decision and Control (CDC)*, pages. 5664-5669.

2. Della Rossa, M. and Tanwani, A. and Zaccarian, L. (2019). Smooth approximation of patchy Lyapunov functions for switched systems. *11th IFAC Symposium on Nonlinear Control Systems (NOLCOS),* pages. 2405-8963.

3. Della Rossa, M. and Goebel, R. and Tanwani, A. and Zaccarian, L. (2019). Almost everywhere conditions for hybrid Lipschitz Lyapunov functions. *IEEE 58th Conference on Decision and Control (CDC)*, pages. 8148-8153.

4. Della Rossa, M. and Pasquini, M. and Angeli, D. (2020). Path-complete Lyapunov functions for continuous-time switching systems. *IEEE 59th Conference on Decision and Control (CDC)*, pages. 3279-3284.

5. Debauche, V. and Della Rossa, M. and Jungers, J. (2021). Template-dependent lifts for path-complete stability criteria and application to positive switching systems. *7th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS)*, pages. 151-156.

6. Della Rossa, M. and Wang, Z. and Egidio, L.N. and Jungers, R. (2021). Data-driven stability analysis of switched affine systems. *IEEE 60th Conference on Decision and Control (CDC)*, pages. 3204-3209.

7. Debauche, V. and Della Rossa, M. and Jungers, R. (2022) Necessary and sufficient conditions for template-dependent ordering of path-complete Lyapunov methods. *25th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*

8. Della Rossa, M. and Jungers, R. (2022)Almost sure Stability of Stochastic Switched Systems: Graph lifts-based Approach*IEEE 61th Conference on Decision and Control (CDC)*

9. Alves Lima, T. and Della Rossa, M. and Gouaisbaut, F. and Jungers, M. and Tarbouriech, S. (2022) Switched systems approach to stability of systems with both constant and time-varying delays *IEEE 61th Conference on Decision and Control (CDC)*

Employment History

Nov '20 - May '23 Université Catholique de Louvain - *Louvain-La-Neuve / Belgium*
Postdoc / ICTEAM

Part of the Project of the European Research Council (ERC) under the *European Union's Horizon 2022 research and innovation program*, grant agreement No 864017 - L2C.
Principal Investigator: Prof. *Raphaël M. Jungers.*

Jun '23- Università degli Studi di Udine - *Udine / Italy*
Postdoc / Assegnista di Ricerca

"Nonlinear evolution problems and applications to optimal control of epidemic models." "Problemi di evoluzione nonlineari e applicazioni al controllo ottimo di epidemie" Principal Investigator: Prof. *Lorenzo Freddi.*

Teaching Assistant

Jan '19 - Jun '19 Basic Mathematics
IUT-GMP Toulouse-Université Toulouse III Paul Sabatier, 64h

Doctorant Chargé d'Enseignement/ PhD teaching assistant

Sep '19 - Jan '20 Tutorial in Linear Algebra and Analysis
INSA Toulouse- Génie Mathématique et Modélisasion, 18h

PhD teaching assistant

Sep '21 - Jan '22 LINMA2380 - Matrix Computations
Université catholique de Louvain (UCLouvain), Louvain-La-Neuve, Belgium, 20h

Teaching assistant

Sep '22 - Jan '23 LINMA2380 - Matrix Computations
Université catholique de Louvain (UCLouvain), Louvain-La-Neuve, Belgium, 20h

Teaching assistant

Sep '23 - Jan '24 Basic Calculus
Università degli Studi di Udine, Civil and Electronic Engineering, 1st year

Teaching assistant

Reviewer and Editorial activities

I have been a reviewer for several journals in optimization and automatic control fields, such as *SIAM, Journal on Control and Optimization*, *Automatica*, *IEEE Transactions on Automatic Control*, *Systems and Control Letters*, *IEEE Control Systems Letters*, *Nonlinear Analysis: Hybrid Systems*, and for international conferences relevant to the sector, such as *IEEE Conference on Decision and Control*, *IFAC World Congress.*

Awards

2023 Nonlinear Analysis: Hybrid Systems Paper Prize

Awarded to the Paper: "*Comparison of path-complete Lyapunov functions via template-dependent lifts*"joint work with V. Debauche and R. M. Jungers".
Consigned at IFAC World Congress 2023, Yokohama, Japan

Invited Lectures

05/09/2019 Title: "Smooth Approximation of Patchy Lyapunov Functions for Switched Systems"
11th IFAC Symposium on Nonlinear Control Systems (NOLCOS), Vienna, Austria

12/12/2019 Title: "Almost Everywhere Conditions for Hybrid Lipschitz Lyapunov Functions"
IEEE 58th Conference on Decision and Control (CDC) Nice, France

09/11/2020 Title: "Path-complete techniques and contiunous-time systems, recent developements"
ICTEAM, Cyber-Physical systems research group weekly meeting, Louvain-La-Neuve, Belgique

16/12/2020 Title: "Path-complete Lyapunov functions for continuous-time switching systems"
IEEE 59th Conference on Decision and Control (CDC) (Virtual)

15/12/2021 Title: "Data-Driven Stability Analysis of Switched Affine Systems"
IEEE 60th Conference on Decision and Control (CDC) (Virtual)

09/06/2022 Title: "Dwell-time stability analysis for switched systems:
from linear to (very structured) non-linear subsystems"
Séminaire d'Automatique du Plateau de Saclay, L2S, CentraleSupélec, Paris-Saclay, France

07/12/2022 Title: "Almost sure Stability of Stochastic Switched Systems: Graph lifts-based Approach"
IEEE 61th Conference on Decision and Control (CDC), Cancun, Mexico)

26/01/2023 Title: "Dwell-time stability analysis for switched systems:
from linear to (very structured) non-linear subsystems"
Centre Automatique et Systèmes (CAS), Paris, Mines Paris Tech, France

Languages

	English	French	Portuguese (BR)	Italian
Speaking	Excellent	Excellent	Good	Mother tongue
Writing	Excellent	Very Good	Beginner	
Reading	Excellent	Excellent	Very Good	
Listening	Excellent	Excellent	Very Good	

General Skills

- **Programming Languages**
  MatLab

- **Miscellaneous**
  Google Apps
  Office Package
  LaTeX
  Driver's license "B"

Referees

- **Prof. Luca Zaccarian**
  Professor (Google Scholar, Homepage)
  LAAS-CNRS, Toulouse, France and
  University of Trento, Italy
  7 avenue du Colonel Roche,
  31400 Toulouse, France
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- **Dr. Aneel Tanwani**
  CNRS Researcher (Google Scholar, Homepage)
  LAAS-CNRS, Toulouse, France
  7 Avenue du Colonel Roche
  31400 Toulouse, France
  email: aneel.tanwani@laaf.fr

• **Prof. Raphaël M. Jungers**
Professor (Google Scholar, Homepage)
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