Decreto Rettore Università di Roma “La Sapienza” n.2267/2021 del 09.08.2021,
CV redatto ai fini della pubblicazione

ANNA CHIARA LAI
Curriculum Vitae

Part I – General Information

Full Name	Anna Chiara Lai

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,…)
PhD (Dottorato di ricerca and Doctorat de recherche)	2010	Sapienza Università di Roma Université Paris Diderot	Modelli e metodi matematici per la tecnologia e la società by a “cotutela” agreement also “Informatique”
University graduation	2006	Università degli Studi di Roma Tre	Laurea specialistica in Matematica con voti 110/110 e lode
University graduation	2004	Università degli Studi di Roma Tre	Laurea triennale in Matematica con voti 106/110

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
01/10/19	Current position	Sapienza Università di Roma	Ricercatore a tempo determinato di tipologia A
1/12/16	22/07/18	Sapienza Università di Roma	Assegno di ricerca ai sensi dell’art. 22 della L. 240/2010 at Dipartimento di Scienze di base e applicate per l’ingegneria
01/02/15	30/11/15	Università degli Studi di Roma Tre	Assegno di ricerca ai sensi dell’art. 22 della L. 240/2010 at Dipartimento di Matematica e Fisica

01/12/13	30/11/14	Sapienza Università di Roma	Assegno di ricerca ai sensi dell'art. 22 della L. 240/2010 at Dipartimento di Scienze di base e applicate per l'ingegneria
01/12/12	30/11/13	Università degli studi di Padova	Assegno di ricerca ai sensi dell'art. 22 della L. 240/2010 at Dipartimento di Matematica
01/10/10	30/9/11	Sapienza Università di Roma	Assegno di ricerca ai sensi dell'art. 51 comma 6, della Legge 27/12/1997, n. 449, e successive modificazioni at Dipartimento di Scienze di base e applicate per l'ingegneria

IIIB – Other Academic Appointments

Start	End	Institution	Position
1/10/12	31/3/13	Sapienza Università di Roma	Collaborazione coordinata e continuativa Simulazioni numeriche per problemi di controllo ottimo e discreto

Maternity leaves: from January 8 2017 to June 13 2017 and from December 27 2017 to March 12 2018. (total: 7 month and 22 days).

Part IV – Teaching experience

Academic Year	Institution	Lecture/Course
2020/21	Sapienza Università di Roma Dipartimento di Scienze di Base e Applicate per l'Ingegneria	PhD Course "Introduzione ai frattali e studio di problemi al contorno in domini irregolari – Modulo I"- 3CFU Dottorato di Ricerca in Modelli Matematici per l'Ingegneria, Elettromagnetismo e Nanoscienze - Curriculum matematica per l'ingegneria
2020/21	Sapienza Università di Roma Dipartimento di Scienze Statistiche	PhD Course "Real Analysis"- 3CFU Dottorato di Ricerca in Scuola di Scienze Statistiche
2019/20	Sapienza Università di Roma Dipartimento di Scienze di Base e Applicate per l'Ingegneria	PhD Course "Introduzione ai frattali e studio di problemi al contorno in domini irregolari – Modulo I"- 3CFU Dottorato di Ricerca in Modelli Matematici per l'Ingegneria, Elettromagnetismo e Nanoscienze - Curriculum matematica per l'ingegneria

2020/21	Sapienza Università di Roma Facoltà di Ingegneria Civile ed Industriale	Analisi Matematica II (9 CFU) Corso di Laurea in Ingegneria Chimica (ricercatore di tipo A - titolare del corso)
2019/20	Sapienza Università di Roma Facoltà di Ingegneria dell'informazione, informatica e statistica	Analisi Matematica I (6 CFU) Corso di Laurea in Ingegneria Informatica e Automatica (ricercatore di tipo A - titolare del corso)
2018/19	Sapienza Università di Roma Facoltà di Ingegneria dell'informazione, informatica e statistica	Analisi Matematica I (6 CFU) Corso di Laurea in Ingegneria Informatica e Automatica (docente a contratto - titolare del corso)
2015/16	Sapienza Università di Roma Facoltà di Ingegneria dell'informazione, informatica e statistica	Analisi Matematica I (12 CFU) Corso di Laurea in Ingegneria Informatica e Automatica (docente a contratto - titolare del corso)
2010/11	Sapienza Università di Roma Facoltà di Ingegneria dell'informazione, informatica e statistica	Analisi Matematica I (9 CFU) Corso di Laurea in Ingegneria Gestionale (docente a contratto - titolare del corso)
2011/12	Sapienza Università di Roma Facoltà di Ingegneria dell'informazione, informatica e statistica	Analisi Matematica II (6+6 CFU) Corso di Laurea in Ingegneria Informatica e Automatica (co-docente)
2009/10	Sapienza Università di Roma Facoltà di Ingegneria Civile ed Industriale	Analisi Matematica II (3 CFU) Corso di Laurea in Ingegneria Energetica (co-docente)
October 11 2011	Department of Information Engineering, Electronics and Telecommunications SAPIENZA University of Rome	Commissario per le seguenti sedute di Laurea a) Laurea Specialistica in Ingegneria Elettronica b) Laurea Magistrale in Ingegneria Elettronica c) Laurea di Vecchio Ordinamento in Ingegneria Elettronica

Part V - Society memberberships, Awards and Honors

Year	Title
2021	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”
2020	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”
2018	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”
2017	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”
2016	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”
2012	aderente al gruppo Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni - Istituto Nazionale di Alta Matematica "Francesco Severi”

Part VI - Funding Information [grants as PI-principal investigator or I-investigator]

Year	Title	Program	Grant value
2020	Mathematical control models and applications Principal Investigator	Finanziamenti di Ateneo per la ricerca scientifica – anno 2020 - Progetti Piccoli - Sapienza Università di Roma	3000 €
2016	Mathematical models for biological processes Principal Investigator	Progetto di ricerca 2016 - GNAMPA - INDAM	1200 €
2020	Problemi di controllo estesi: gap, condizioni di ordine superiore e funzioni di Lyapunov Investigator	Progetto di ricerca 2020 - GNAMPA - INDAM	2025 €
2018	Fractional Derivatives in Science and Engineering Investigator	Finanziamenti di Ateneo per la ricerca scientifica - Progetti Medi - Sapienza Università di Roma	12000 €
2017	Optimal impulsive control: higher order necessary conditions and gap phenomena Investigator	Progetto di ricerca 2017 - GNAMPA - INDAM	
2016	Mathematical Models and Controllability Investigator	Finanziamenti di Ateneo per la ricerca scientifica - Progetti Medi - Sapienza Università di Roma	9500 €
2015	2015 Models and Methods in Control Theory Investigator	Finanziamenti di Ateneo per la ricerca scientifica - Progetti Piccoli - Sapienza Università di Roma	4000 €
2014	Networks, controllabilità ed applicazioni Investigator	Finanziamenti di Ateneo per la ricerca scientifica - Sapienza Università di Roma	6000 €
2013	Networks e controllabilità Investigator	Finanziamenti di Ateneo per la ricerca scientifica - Sapienza Università di Roma	7000 €

2011-2014	Sensitivity Analysis for Deterministic Controller Design Investigator	Marie Curie ITN - contract nr. 264735-SADCO	Total funding € 5.700.591,13 Local unit funding (Sapienza Università di Roma) € 857.356,51

Part VII – Research Activities

Keywords	Brief Description (citations in bold refer to selected publications)
Control theory, optimal control of PDE, mathematical modeling	***Differential control models for bio-inspired soft robotics***. Soft-robotics aims to provide highly flexible, soft robotic devices in order to enhance human-robot interactions, robotic surgery and search and rescue missions in catastrophic scenarios. An important branch is given by bio-inspired soft robotics. In this framework, my research activity included the design and optimization of a control model for a tentacle-like soft manipulator. The resulting equation of motion is a controlled generalization of the nonlinear Euler-Bernoulli beam, a fourth-order, nonlinear, evolutive, control partial differential equation. The optimization processes rely on the optimal control theory of partial differential equations. The optimal control problems under exam include the following goals: low energy consumption, reachability, grasping, and obstacle avoidance in a stationary setting. For the optimal reachability problems also the dynamic setting is investigated. More precisely, in [**CLL20**] the model is introduced, the equilibria are investigated and the reachable set of the free endpoint is characterized by establishing a relation with the Dubin's car problem. An optimal reachability problem is addressed and numerically solved in both the dynamic and stationary settings. Note that the model in [**CLL20**] is obtained as a formal limit of a discrete system, which in turn models a planar hyper-redundant manipulator subject to analogous, discrete, constraints. In [**CLL21**] the discrete (and rigid) and continuous (soft) models are directly compared. Moreover, [**CLL21**] contains optimal reachability problems in both a static and dynamic setting: the model is tested in the case of uncontrolled subregions (simulating mechanical breakdowns). Finally optimal grasping problems are addressed: the goal is to grasp an object (without interpenetrating it) while minimizing a quadratic cost on the curvature controls. The model allows to prioritize the preferred contact regions of the manipulator with the grasped object: several numerical tests are presented to illustrate this feature. The conference paper **[CLL21a]** investigates the optimality of the configurations of a tentacle-like soft manipulator ensuring the contact with a target object, while avoiding an obstacle. The main novelty consists in treating the contact sub-region of the manipulator as an unknown of the problem and, at the same time, in allowing the target to be disconnected. The optimization problem is first set in full generality, then specialized to the case of a multi-target problem, in which the goal is to simultaneously reach a finite set of points. Numerical simulations complete the paper. This line of research also includes the works [CLL19, CLL20a].

Control theory, optimal control of ODE, mathematical modeling	***Stabilizzability and optimal control of ODEs****.* A classical result in control theory of ordinary differential equations establishes the equivalence between the global asymptotic controllability (GAC), the sample stabilizability and the existence of a Control Lyapunov functions, under suitable regularity and boundedness assumptions. This ensures in particular the existence of stabilizing feedbacks from the apparently weaker assumption of GAC. My research activity includes an investigation of the relations between GAC, sample stabilizability and control Lyapunov functions in the case of *unbounded* control system, where a cost is also considered. This is motivated by the applications to mechanical systems for which the control is a moving holonomic constraint, for which control polynomial systems with *unbounded control set* (the so-called vibrating controls) emerge.More precisely, in [LMR16] it is proved that existence of a special Control Lyapunov Function called Minimum restraint function (MRF) implies GAC with regulated cost for a wide class of unbounded control systems. The paper **[LM20]** proves that the existence of MRFs also implies the sample and Euler stabilizability with regulated cost for bounded control system. In [**LM19**] the impulsive, control-affine case is discussed. The notions of impulsive and regular Sample and Euler stabilizability with regulated cost are introduced and sufficient conditions, based on the existence of suitable MRFs are established. The paper [**LM21**] discusses the fully non-linear case for unbounded systems and for their impulsive extensions. Sufficient conditions for sample, Euler and (the new notion of) weak Euler stabilizability with regulated cost are established. Finally, in [LM21preprint] Lyapunov theorems are presented for a wide class of unbounded control systems: this generalized to the unbounded case the well-known equivalence between GAC, sample stabilizability and the existence of a Control Lyapunov Function. ***Modeling and control for opinion formation dynamics****.* The paper [CLP15] presents a model for opinion dynamics on the d-dimensional sphere based on classical consensus algorithms. The choice of the model is motivated by the analysis of the comprehensive literature on the subject, both from the mathematical and the sociological point of views. The resulting dynamics is highly nonlinear and therefore presents a rich structure. Equilibria and asymptotic behavior are then analyzed and sufficient condition for consensus are established. Finally, global stabilization and controllability are addressed.

Fractional calculus, combinatorics, mathematical modeling	***Fractional epidemic models*** Compartmental epidemic models are characterized by the division of the population in sub-groups, whose evolution is classically governed via ordinary differential equations. The introduction of *fractional epidemic models,* whose dynamics is governed by fractional differential operators, allowed to enrich the systems with a memory term, that can be interpreted as a "collective memory" of the past responses to the epidemic. My research activity focused on fractional SIS models, in which the total population is divided into susceptible and infected. As in the case of common cold, in the (fractional) SIS models there is not permanent immunization: after recovering from the disease, infected members of the population return in the susceptible compartment. The preprint **[**CLL21preprint**]** contains an asymptotic analysis of fractional generalization of the SIS epidemic model based on Caputo-Fabrizio differential operator. The paper **[BDLL21]** is devoted to a local, asymptotic and numerical analysis of a SIS epidemic model characterized by mixed orders of fractional derivation for both Caputo and Caputo-Fabrizio operators. ***Combinatorial problems applied to fractional calculus:*** Bernoulli equations were first investigated by Jakob Bernoulli in 1695. This class of ODEs contains the logistic equation as a particular case, whereas the general case recurred in non-linear models in economy and biomedicine. In [**DLL21**] a fractional version of Bernoulli equations is considered. The adopted fractional differential operator is the Caputo derivative. A general series representation formula for local solutions to Bernoulli equations is presented. The particular case of fractional logistic equations is studied in detail and supported by several numerical simulations. The preprint [DLL20preprint] contains a combinatorial study of a class of generalized binomial coefficients recurring in fractional calculus, for instance in the study of fractional logistic equations.
Observability, linear PDEs, Fourier analysis	***Simultaneous observability for linear PDEs*** A classical matter in the theory of control of linear partial differential equations is the controllability of the system, i.e., the possibility to steer an oscillatory system, say a string or a beam to the rest position by acting on its endpoints. By duality, this problem is equivalent to the observability of the system, that is, the existence of a one-to-one correspondence between the evolution of one the endpoints in a given interval of time and the initial datum. Simultaneous observability consists in the possibility to reconstruct initial data of different systems with a common endopoint from the observation of its evolution , for a sufficiently large time called *observability time*. Many results were obtained in this framework, my research activity included the investigation of the case in which an arbitrary large (possibly infinite) number of beams or strings is considered. In particular, in [**KLP20**] were established simultaneous observability conditions based on Fourier analysis for a system of (possibly infinite) vibrating strings and beams. The theoretical background includes vectorial generalizations of results of Ingham, Beurling and Kahane and the applications of earlier results from the theory of diophantine approximation. Also, in [**Lai19**] observability results on tiled domains are investigated.

Discrete mathematics, number theory, and applications to robotics, quantum computing, and theoretical computer science	My research activity also included several aspects and applications of discrete mathematics, mostly oriented to fractal and recursive structures and a related combinatorial analysis. More precisely, I investigated the following problems: ***Number theory and fractal geometry for self-similar hyper-redundant manipulators*** Investigation of expansions in non-integer [KLP11, Lai11], negative [FL10,LF09] and in complex [Lai12] bases, of the related fractal structures, and their applications to reachability problems for self-similar hyper-redundant manipulators [LL12,LL12a,LL14,LL14a,LL15,**LLV16**,LLVa16]. In particular, the paper **[LLV16]** presents a model for snake-like robots based on the Fibonacci sequence. The key idea is to introduce a general class of *Fibonacci control systems,* whose reachability and local controllability properties are investigated with fractal geometry techniques. This general model is then specialized to the snake-like robot under exam, and some fractal properties of the reachable workspace are established by means the theory of iterated function systems ***Recursive structures in quantum mechanical systems, and applications to quantum computing.*** Entanglement is a key feature of quantum mechanical systems with wide applications to the field of quantum information theory. Applications to quantum information theory motivate the search for the mathematical characterizations of multi-particle entanglement and for highly entangled quantum states. The study performed in [**LPR16**] yields an orthonormal base of maximally entangled states, recursively generated by an arbitrarily high-dimensional generalization of the cnot gate. ***Discrete mathematics in theoretical computer science*** Discrete processes and graph theory for stream-based computation: the aim of the research presented in [LPP19] is to enhance parallelization techniques for low-level computational models.

Part VIII – Summary of Scientific Achievements

Product type	Number	Data Base	Start	End
Articles	17	Scopus	2009	2021
Articles in the last 10 years	18	“Simulazione ASN su dati IRIS” (without considering maternity leaves)	2011	2021
Conference Papers	9	Scopus	2009	2021

Total Impact factor	**22,443** (total 2020 impact factors for all contributions - source WoS) **19,648** (sum of impact factors related to the publication year for all contributions- source WoS)
Total Citations	137 (scopus)

Average Citations per Product	5.26 (computed by dividing 137 citations (scopus) by 26 products (scopus)) 4.68 (Web of Science)
Hirsch (H) index	7 (scopus)
Normalized H index*	0.58 (7/12 - 12 years from the first publication in 2009 - rough data from Scopus) 0.63 (7/11 - 11 years from PhD graduation in 2010 - rough data from Scopus)

*H index divided by the academic seniority.

List of publications:

Preprints

- [CLLpreprint] Cacace, S., Lai, A. C., and Loreti, P., A dynamic programming approach for controlled fractional SIS models, arXiv:2107.13316, submitted.
- [DLL20preprint] D'Ovidio, M., Lai, A. C., and Loreti, P., Generalized binomials in fractional calculus, arXiv:2010.05610, submitted.
- [LM21preprint] Lai, A. C., and Motta, M., Converse Lyapunov theorems for control systems with unbounded controls, arXiv:2109.04126, submitted.

Publications

1. [**BDLL21**] Balzotti, C., D'Ovidio, M., Lai, A.C., Loreti, P.
   Effects of fractional derivatives with different orders in SIS epidemic models
   (2021) Computation, 9 (8), art. no. 89.

2. [**LM21**] Lai, A.C., Motta, M.
   Stabilizability in optimization problems with unbounded data
   (2021) Discrete and Continuous Dynamical Systems- Series A, 41 (5), pp. 2447-2474.

3. [**CLL21a**] Cacace, S., Lai, A.C., Loreti, P.
   Multi-target optimal control problems for a tentacle-like soft manipulator
   (2021) Proceedings of the 18th International Conference on Informatics in Control, Automation and Robotics, ICINCO 2021, pp. 39-48.

4. [**CLL21**] Cacace, S., Lai, A.C., Loreti, P.
   Optimal Reachability and Grasping for a Soft Manipulator
   (2021) Lecture Notes in Electrical Engineering, 720, pp. 16-34.

5. [**KLL20**] Komornik, V., Lai, A.C., Loreti, P.
   Simultaneous observability of infinitely many strings and beams
   (2020) Networks and Heterogeneous Media, 15 (4), pp. 633-652.

6. [**LM20**] Lai, A.C., Motta, M.
Stabilizability in optimal control
(2020) Nonlinear Differential Equations and Applications, 27 (4), art. no. 41, .

7. [**CLL20a**] Cacace, S., Lai, A.C., Loreti, P.
Optimal reachability with obstacle avoidance for hyper-redundant and soft manipulators
(2020) ICINCO 2020 - Proceedings of the 17th International Conference on Informatics in Control, Automation and Robotics, pp. 134-141.

8. [**CLL20**]Cacace, S., Lai, A.C., Loreti, P.
Modeling and optimal control of an octopus tentacle
(2020) SIAM Journal on Control and Optimization, 58 (1), pp. 59-84.

9. [LPP19] Lai, A.C., Pedicini, M., Piazza, M.
Abstract machines, optimal reduction, and streams
(2019) Mathematical Structures in Computer Science, 29 (9), pp. 1379-1410.

10. [**LM19**] Motta, M., Lai, A.C.
Stabilizability in impulsive optimization problems
(2019) IFAC-PapersOnLine, 52 (16), pp. 352-357.

11. [CLL19] Cacace, S., Lai, A.C., Loreti, P.
Control strategies for an octopus-like soft manipulator
(2019) ICINCO 2019 - Proceedings of the 16th International Conference on Informatics in Control, Automation and Robotics, 1, pp. 82-90.

12. [**Lai19**] Lai, A.C.
Internal observability of the wave equation in tiled domains
(2019) Rendiconti di Matematica e delle Sue Applicazioni, 40 (1), pp. 1-16.

13. [LLV16] Lai, A.C., Loreti, P., Vellucci, P.
A Continuous Fibonacci Model for Robotic Octopus Arm
(2016) Proceedings - UKSim-AMSS 2016: 10th European Modelling Symposium on Computer Modelling and Simulation, art. no. 7920236, pp. 99-103.

14. [**LPR16**] Lai, A.C., Pedicini, M., Rognone, S.
Quantum entanglement and the Bell matrix
(2016) Quantum Information Processing, 15 (7), pp. 2923-2936.

15. [**LLV16**] Lai, A.C., Loreti, P., Vellucci, P.
A Fibonacci control system with application to hyper-redundant manipulators
(2016) Mathematics of Control, Signals, and Systems, 28 (2), art. no. 15, .

16. [LMR16] Lai, A.C., Motta, M., Rampazzo, F.
Minimum restraint functions for unbounded dynamics: general and control-polynomial systems
(2016) Pure and Applied Functional Analysis, 4 (1), pp. 583-612

17. [LL15] Lai, A.C., Loreti, P.
Self-similar control systems and applications to zygodactyl bird's foot
(2015) Networks and Heterogeneous Media, 10 (2), pp. 401-419.

18. [CLP15] Caponigro, M., Lai, A.C., Piccoli, B.
A nonlinear model of opinion formation on the sphere
(2015) Discrete and Continuous Dynamical Systems- Series A, 35 (9), pp. 4241-4266.

19. [LL14a]Lai, A.C., Loreti, P., Vellucci, P.
A model for robotic hand based on fibonacci sequence
(2014) ICINCO 2014 - Proceedings of the 11th International Conference on Informatics in Control, Automation and Robotics, 2, pp. 577-584.

20. [LL14]Lai, A.C., Loreti, P.
Robot's hand and expansions in non-integer bases
(2014) Discrete Mathematics and Theoretical Computer Science, 16 (1), pp. 371-394.

21. [LL12a] Lai, A.C., Loreti, P.
Robot's finger and expansions in non-integer bases
(2012) Networks and Heterogeneous Media, 7 (1), pp. 71-111.

22. [LL12] Lai, A.C., Loreti, P.
Discrete asymptotic reachability via expansions in non-integer bases
(2012) ICINCO 2012 - Proceedings of the 9th International Conference on Informatics in Control, Automation and Robotics, 2, pp. 360-365.

23. [Lai12]Lai, A.C.
Geometrical aspects of expansions in complex bases
(2012) Acta Mathematica Hungarica, 136 (4), pp. 275-300.

24. [Lai11] Lai, A.C.
Minimal unique expansions with digits in ternary alphabets
(2011) Indagationes Mathematicae, 21 (1-2), pp. 1-15.

25. [KLP11] Komornik, V., Lai, A.C., Pedicini, M.
Generalized golden ratios of ternary alphabets
(2011) Journal of the European Mathematical Society, 13 (4), pp. 1113-1146.

26. [FL11] Frougny, C., Lai, A.C.
Negative bases and automata
(2011) Discrete Mathematics and Theoretical Computer Science, 13 (1), pp. 75-94.

27. [FL09] Frougny, C., Lai, A.C.
On negative bases
(2009) Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 5583 LNCS, pp. 252-263.

Part IX– Selected Publications

List of the publications selected for the evaluation. For each publication report title, authors, reference data, journal IF (if applicable), citations, press/media release (if any).

1. Balzotti, C., D'Ovidio, M., Lai, A.C., Loreti, P. (2021) Effects of fractional derivatives with different orders in SIS epidemic models COMPUTATION, **9** (8), art. no. 89.
2020 IF n.a., Citations 0 (scopus)

2. Cacace, S., Lai, A.C., Loreti, P. Multi-target optimal control problems for a tentacle-like soft manipulator (2021)Proceedings of the 18th International Conference on Informatics in Control, Automation and Robotics, ICINCO 2021, pp. 39-48.
2020 IF n.a., Citations 0 (scopus)

3. Cacace, S. Lai, A.C., Loreti, P. Optimal Reachability and Grasping for a Soft Manipulator (2021) *Lecture Notes in Electrical Engineering,* art. no. 720, 16-34.
IF n.a., Citations 0 (Scopus)

4. Cacace S., A.C. Lai, P. Loreti (2020). Modeling and optimal control of an octopus tentacle. SIAM JOURNAL ON CONTROL AND OPTIMIZATION, **58**(1), p. 59-84.
2020 IF 2.267, Citations 4 (Scopus)

5. D'Ovidio, M., A.C. Lai, A. C., P. Loreti. (2021). Solutions of Bernoulli equations in the fractional setting. FRACTAL AND FRACTIONAL, *5*(2), art. no. 57.
2020 IF 3.313, Citations 0 (Wos)

6. Komornik, V. , A.C. Lai, P. Loreti, (2020). Simultaneous observability of infinitely many strings and beams. NETWORKS AND HETEROGENEOUS MEDIA, **15**(4), p. 633-652
2020 IF 1.213, Citations 0 (Scopus)

7. Lai, A.C. (2019). Internal observability of the wave equation in tiled domains. RENDICONTI DI MATEMATICA E DELLE SUE APPLICAZIONI, **40**(1), p. 1-16
IF n.a., Citations 0 (Scopus)

8. Lai, A. C. , P. Loreti, P. Vellucci(2016) A Fibonacci control system with application to hyper-redundant manipulators, Mathematics of Control, Signals, and Systems, **28**(2), article number 15.
2016 IF 1.667, Citations 7 (Scopus)

9. Lai, A.C., Motta, M., Stabilizability in impulsive optimization problems (2019) IFAC-PapersOnLine, 52 (16), pp. 352-357.
2019 IF n.a., Citations 2 (WoS)

10. Lai, A. C., M. Motta (2020). Stabilizability in optimal control. NODEA-NONLINEAR DIFFERENTIAL EQUATIONS AND APPLICATIONS, 27(4), n. 41.
2020 IF 1.286, Citations 2 (WoS)

11. Lai, A. C. , M. Motta, (2021). Stabilizability in optimization problems with unbounded data. DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS, **41**(5), p. 2447–2474
2020 IF 1.392, Citations 1 (scopus)

12. Lai, A.C., M. Pedicini, S. Rognone, Quantum entanglement and the Bell matrix (2016) QUANTUM INFORMATION PROCESSING, **15** (7), pp. 2923-2936.
2016 IF 2.192 , Citations 1 (Scopus)

Part X– Other achievements and scientific activities

Abilitazione scientifica nazionale alle funzioni di professore di II fascia di cui all'articolo 16 della legge 30 dicembre 2010, n. 240 per il Settore concorsuale 01/A3 conseguita in data l 07/05/2021, nella tornata 2018-2020, VI quadrimestre.

Conferences

Organization

1. Member of the organizing committee of "Numeration 2017" Roma June 5-9 2017. http:// logica.uniroma3.it/jn17/

2. Organizer of the Minisimposium at Simai 2018 "Discrete mathematics, number theory and applications to control" Roma July 2-7 2018. https://ocs.simai.eu/index.php/SIMAIcongress/SIMAI2018

3. Co-organizer (together with S. Cacace, Università degli Studi di Roma Tre) of the Minisimposium at Simai 2020+21 "Optimal control, differential games and applications" . Parma August 31 Agosto-September 4 2021. In the same venue I presented the talk *A PDE approach to a tentacle-like soft manipulator: modeling and reachability.*

Invited talks

1. Seminario di Modellistica numerica e differenziale, Sapienza Università di Roma, October 25 2011. *A multi-phalanx self-similar robot hand model.*

2. Seminario su Equazioni differenziali e Applicazioni, Università degli Studi di Padova, January 11 2013. *Multi-agent systems modeling opinion dynamics and related problems.*

3. Seminario di Modellistica numerica e differenziale, Sapienza Università di Roma, March 13 2013. *Agent-based models for opinion dynamics.*

4. Dipartimento di Scienze di Base e Applicate per l'Ingegneria, Sapienza Università di Roma, December 13 2013. *Mathematical models for quasicrystals;*

5. Controllability and Networks, Conference in honour of the 60th birth-day of Vilmos Komornik, Sapienza Università di Roma, May 26 - 28 2014. *A Fibonacci control system.*

6. Seminario di Logica e Informatica Teorica, Università Roma Tre, June 6 2014. *Mathematical models for quasicrystals and expansions in non-integer bases.*

7. Analysis and Geometry in Control Theory and its Applications, INDAM, Roma, June 9 - 13 2014. *Asymptotic controllability for polynomial control systems.*

8. Seminari di Equazioni Differenziali e Applicazioni, Dipartimento di Matematica e Fisica, Università degli Studi di Padova, April 11 2016. *Global asymptotic controllability and cost estimates for systems with unbounded controls*

9. Seminario di Geometria, Dipartimento di Scienze di Base e Applicate, Sapienza Università di Roma, April 27 aprile 2016 . *Tilings, quasicristals and trigonometric inequalities.*

10. Special Session “Variational convergence and Degeneracies in PDES: fractal domains, composite media, dynamical boundary conditions", 11th bi-annual Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, USA on July 1-5 2016. *Trigonometrical inequalities on regular lattices*

11. Special Session “Geometric Methods in Mechanics and Differential Equations”, 11th bi-annual Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, USA July 1-5 2016. *Global asymptotic controllability for control systems with unbounded inputs.*

12. "Control of state constrained dynamical systems", September 25-29, 2017 - Dipartimento di Matematica “Tullio Levi- Civita”, Università di Padova. September 25-29 2017, *Global asymptotic controllability for unbounded control systems.*

13. 13th International Conference on Large-Scale Scientific Computations June 7 - 11, 2021, online presentation of the talk *Stabilizability in optimization problems*

Contributed talks

1. Workshop on Dynamical Aspects of Numeration 2006. LIAFA, Paris, 4-6 dicembre 2006. *Ergodic properties of greedy expansions.*

2. Workshop on Dynamical Aspects of Number System 2008. IAC-CNR Roma, 6-8 febbraio 2008. *Critical constants for general alphabets with three digits.*

3. Numération: Mathematics and Computer Science. CIRM, Marseille March 23-27 2009. *On expansions in negative bases.*

4. DLT 2009 - 13-th International Conference on Developments in Language Theory, Universitaat Stuttgart, June 30 giugno - July 3 2009. *On negative bases.*

5. CONCERTO Final Meeting, Torino, June 9-11 2010. *Minimal unique expansions with digits ternary alphabets.*

6. SIMAI 2010 - SIMAI Biennial conference, sessione MSP33. Università di Cagliari, June 21- 25 2010. *Unique expansions for ternary alphabets.*

7. Numération 2011, Université de Liege, June 6-10 2011. *Expansions in complex bases.*

8. ICINCO 2012 - 9-th International Conference on Informatics in Control, Automation and Robotics. Rome, July 28-31 2012. *Discrete asymptotic reachability via expansions in non-integer bases*

9. ICINCO 2014 - 11-th International Conference on Informatics in Control, Automation and Robotics. Wien, September 1-3 2014. *A model for robotic hand based on Fibonacci sequence.*

10. ICINCO 2019 - 16-th International Conference on Informatics in Control, Automation and Robotics. Praga, July 29-31 2019. *Control strategies for an octopus-like soft manipulators*

11. ICINCO 2020 - 17-th International Conference on Informatics in Control, Automation and Robotics. Online conference due to Covid 19 emergency. July 7-9 2020. *Optimal reachability with obstacle avoidance for hyper-redundant and soft manipulators*

12. ICINCO 2021 - 18th International Conference on Informatics in Control, Automation and Robotics 2020, online conference due to Covid 19 emergency. *Multi-target optimal control problems for a tentacle-like soft manipulator*

Visiting in national and foreign universities.

Département de Mathématique Université de Strasbourg. Invited by Prof. V. Komornik. April 24-29, 2010.

Centre for Computational and Integrative Biology, Camden Rutgers University. Invited by Prof. B. Piccoli. June 14- July 13-07, 2012.

Département de Mathématique Université de Strasbourg. Invited by Prof. V. Komornik. January 25-30, 2015.

Dipartimento di Matematica "Tullio Levi-Civita" Università di Padova. Invited by Prof. Monica Motta . March 03-16 2018

Dipartimento di Matematica "Tullio Levi-Civita" Università di Padova. Invited by Prof. Monica Motta May 15-17 2019

Reviewing activity

Reviewer of a paper submitted to IEEE Transactions on Instrumentation & Measurement 19-07-2015 al 01-12-2015

Reviewer of a paper submitted to Journal of Ergodic Theory and Dynamical Systems
from 14-12-2016 to 24-10-2017 (source Publons-WoS)

Reviewer of a paper submitted to Mathematics and Computers in Simulation, date 26-02-2021 (source Publons-WoS)

Reviewer of a paper submitted to Symmetry, date of the review 19-02-2021 (source Publons-WoS)

Corresponding authorship

Corresponding author for the following articles:

1. Balzotti, C., D'Ovidio, M., Lai, A.C., Loreti, P. (2021) Effects of fractional derivatives with different orders in SIS epidemic models COMPUTATION, **9** (8), art. no. 89.

2. M. D'Ovidio, A.C. Lai, A. C., P. Loreti. (2021). Solutions of Bernoulli equations in the fractional setting. FRACTAL AND FRACTIONAL, *5*(2), art. no. 57.

3. Lai A. C. (2019). Internal observability of the wave equation in tiled domains. RENDICONTI DI MATEMATICA E DELLE SUE APPLICAZIONI, vol. 40, p. 1-16,

4. Lai, A. C., and Loreti, P (2015) "Self-similar control systems and applications to zygodactyl bird's foot." Networks and Heterogeneous Media 10.2: 401.

5. A.C. Lai, P. Loreti Robot's hand and expansions in non-integer bases. DISCRETE MATHEMATICS AND THEORETICAL COMPUTER SCIENCE 16.1 (2014): 371.

6. A. C. Lai, P. Loreti, Robot's finger and expansions in non-integer bases, Networks and Heterogeneus Media, 7 (1) , 71-111, (2012).

7. A.C. Lai, Geometrical aspects of expansions in complex bases, Acta Mathematica Hungarica, 135 1-26, (2012).

8. A.C. Lai, Minimal unique expansions with digits in ternary alphabets, Indagationes Mathematicae, 21 (1-2), 1-15 (20112)

Roma, 28 settembre 2021