CURRICULUM VITAE ET STUDIORUM

Angelo Alessandri

Education and Current Position

1. Born in Genova, Italy, on July 8, 1967.
2. General Certificate of Education from the state-owned Scientific "Liceo" L. Lanfranconi of Genova (five years of high-school studies), July 1986, with full marks (60/60).
3. "Laurea" (MS degree) in Electronic Engineering, received from the University of Genova, on April 8, 1992, with full marks (110/110), "summa cum laude," and printing honours. Title of thesis work: "Neural networks for state estimation and optimal control of nonlinear stochastic systems," with supervisors Prof. R. Zoppoli and Prof. T. Parisini.
4. From April 1993 to April 1994: national service in the Italian Army at the Military School of Parachuting, in Pisa.
5. In November 1996, I got the PhD in Electronic Engineering and Computer Science from the University of Genova. Title of the PhD thesis work: "Neural networks for state estimation and parametric identification of nonlinear systems," with supervisors Prof. R. Zoppoli and Prof. T. Parisini.
6. From November 1, 1996 to December 31, 2005, I was a research scientist at the Naval Automation Institute of the National Research Council of Italy (IAN-CNR).
7. In 2006, I joined the Department of Mechanical, Energetics, Management, and Transportation Engineering (DIME), University of Genova, where I am now a full professor.

Editorial Activity

1. Since February 2019 I have been an *associate editor* of the *European Journal of Control*.
2. Since August 2017 I have been an *associate editor* of the IFAC journal *Automatica*.
3. Since January 2007 I have been an *editor* of the *International Journal of Adaptive Control and Signal Processing*.
4. From 2014 to 2019 I was an an *associate editor* of the *European Control Association (EUCA) Conference Editorial Board*.
5. From 2001 to 2019 I was an *associate editor* of the *Conference Editorial Board* of the *IEEE Control Systems Society*.
6. From 2009 to 2015 I was an *associate editor* of the *IEEE Transactions on Control Systems Technology*.
7. From 2004 to 2010 I was an *associate editor* of the *IEEE Transactions on Neural Networks*.
8. From 2002 to 2010 I was an *associate editor* of the IFAC journal *Engineering Applications of Artificial Intelligence*.

Guest Editor of Special Issue

1. 2022: "Reduced-order, data-driven, and decomposition methods for modelling, identification, and estimation" for the *Int. Journal of Adaptive Control and Signal Processing*, in course.
2. 2020: "Moving horizon estimation and new application perspectives" for the *Int. Journal of Adaptive Control and Signal Processing* [J18].

Program, Scientific, and Technical Committees

1. Since January 2015 I have been a member of the technical committee "Adaptive and Learning Systems" (TC1.2) of the IFAC.
2. Since January 2014 I have been a member of Technical Committee on Distributed Parameter Systems of the IEEE-CSS.
3. As a member of the IEEE-CSS CEB, I was an associate editor for all the meetings of the *American Control Conference* (ACC) e *IEEE Conference on Decision and Control* (CDC) from 2001 to 2019.
4. I was a member of the scientific and/or program committee of Safeprocess 2022, *11th IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes*, Pafos, Cyprus, June 7-10, 2022; *21st IFAC World Congress*, Associate Editor for Power and Process System - Fault Detection, Supervision and Safety of Technical Process, Berlin, Germany, July 12-17, 2020; CPEXPO *Community Protection* 2013, Genova, Italy, October 29-31, 2013; ICONS 2013, *3rd IFAC International Conference on Intelligent Control and Automation Science*, Chengdu, China, September 2-4, 2013; ISNN 2011, *8th International Symposium on Neural Networks*, Guilin, China, May 29-June 1, 2011; ICANN 2009,*19th International Conference on Artificial Neural Networks*, Limassol, Cyprus, September 14-17, 2009; CDC 2008, *47th IEEE Conference on Decision and Control*, Cancun, Mexico, December 9-11, 2008, with the charge of *area editor*; ICNPAA 2008, *Int. Conference on Mathematical Problems in Engineering, Aerospace and Sciences*, Genova, Italy, June 25-27, 2008; WCCI 2008, *IEEE International World Congress on Computational Intelligence*, Hong Kong, China, June 1-6, 2008; ISNN 2007, *IEEE International Symposium on Neural Networks*, Nanjing, China, June 3-7, 2007; ADPRL 2007, *IEEE International Symposium on Approximate Dynamic Programming and Reinforcement Learning*, Honolulu, Hawaii, April 1-5, 2007; 45th CDC, *45th IEEE Conference on Decision and Control*, San Diego, California, December 13-15, 2006; ISIC 2006, *IEEE International Symposium on Intelligent Control*, Munich, Germany, October, October 4-6, 2006; HMS 2003, *Int. Workshop on Harbour, Maritime & Multimodal Logistics Modelling and Simulation*, Riga, Lituania, September 18-20, 2003; ISIC'01 (*International Symposium on Intelligent Control*, Mexico City, Mexico, September 5-7, 2001).
5. As a member of the EUCA CEB, I was associate editor for ECC'19, *17th European Control Conference*, Napoli, Italy, June 25-28, 2019; ECC'18, *16th European Control Conference*, Limassol, Cyprus, June 12-15, 2018; ECC'16, *13th European Control Conference*, Aalborg, Denmark, June 29-July 1, 2015; ECC'15, *14th European Control Conference*, Linz, Austria, July 15-17, 2015; ECC'14, *13th European Control Conference*, Strasbourg, France, June 24-27, 2014.

Visiting Positions

1. In 2019: *visiting professor* at the *Université de Lorraine*, IUT Henri Poincaré, Centre de Recherche en Automatique de Nancy (CRAN), Longwy (Francia), for research on the control of systems described by partial differential equations.
2. In 1998: *visiting scientist* at the Center for Autonomous Underwater Vehicle Research, Department of Mechanical Engineering, *Naval Postgraduate School* (NPS), in Monterey, California, USA. The main subject of this work was the design of fault diagnosis systems for underwater vehicles; it was done in cooperation with Prof. A. J. Healey (NPS).
3. In 1996: *visiting scholar* at the Institute of Systems and Robotics (ISR-IST), *Instituto Superior Tecnico*, Lisbon, Portugal to conduct research on guidance, control, and navigation for underwater vehicles, under the supervision of Prof. A. Pascoal (ISR-IST).

Awards and Fellowships

1. In 2019, my journal publication "Dynamic mode decomposition for the inspection of three-regime separated transitional boundary layers using least squares methods," *Physics of Fluids*, 2019, has been selected as "featured" by the Editor.
2. In 2013, I was one of the winner of *Fincantieri Innovation Challenge* for the project "Marine systems optimal performance by smart control."
3. In 2012, the paper "Moving-horizon state estimation for nonlinear systems using neural networks, IEEE Transactions on Neural Networks, vol. 22, no. 5, pp. 768-780, 2011" was selected among the "best work by CNR researchers."
4. Since November 2002 I have been an *IEEE Senior Member*.
5. In 1999, I was the winner of a CNR prize for the research activity carried out during my stay at NPS.
6. In 1993, I was one of the winners of the "Guglielmo Reiss Romoli" award, founded by STET (currently Telecom Italy), a telephone joint-stock holding company.

Main Teaching Activity

Undergraduate Courses

1. From the academic year 2007/08, I have been charged by the University of Genova with holding the course in "Automatic Control" for Naval Engineering.
2. In the academic years 1996/97 and 1997/98, I was charged by the University of Genova with holding the courses in "System Analysis" for Logistics and Production Engineering as adjunct professor.
3. In the academic years 1993/94 and 1994/95, I was charged by with the teaching assistantship for the course in Automatic Control for Electronic and Computer Engineering.
4. In the academic years 1992/93 and 1995/96, I was charged with the development of experimental exercises for the course in Operations Research for Electronic and Computer Engineering.

Graduate Courses

1. In the academic year 2021/22, I have been charged by the Innopolis University (Kazan, Tatarstan) with holding the course in "Optimization" for Data Analisis and Computer Engineering.
2. From the academic year 2017/18, I have been charged by the University of Genova with holding the course in "Numerical Methods for Naval Engineering."
3. From the academic year 2016/17, I have been charged by the University of Genova with holding the course in "Optimization and Control Methods" for Safety Engineering.
4. From the academic year 2016/17 to 2017/18, I have been charged by the University of Genova with holding the course in "Advanced Control Methods in Ship Propulsion" for Naval Engineering.
5. From the academic year 2003/04 to 2010/11, I was charged by the University of Genova with holding the courses in "System Analysis" for Management Engineering.
6. From the academic year 2002/03 to 2015/16, I was charged by the University of Genova with holding the courses in "Operations Research" for Multimedia Signal Processing and Telecommunication Networks Engineering.

PhD Courses

1. From the academic year 2007/08, I have been charged by the University of Genova with holding the course in "Nonlinear Mathematical Programming."

2. From the academic year 2007/2008 to 2009/10, I was charged by the University of Genova with holding the course in "Hamiltonian Formalism and Optimal Control."

PhD Supervision

1. A. Del Padrone, "On some aspects of polynomial dynamical systems," University of Genova, 2022.
2. D. Bouhadjra, "Modeling and estimation for biological plants," University of Genova and Université de Lorraine, 2022.
3. A. Taddeo, "Backstepping-based control and stabilization of distributed parameter systems: the pool-boiling case," University of Genova, 2016.
4. S. Donnarumma, "Low and high speed motion control of a vessel with actuator saturation," University of Genova, 2016.
5. M. Awawdeh, "Moving-horizon estimation for outliers detection and data mining," University of Genova, 2015.
6. M. Gaggero, "Feedback optimal control of systems described by partial differential equations," University of Genova, 2010.
7. S. Grillo, "Interaction between economics and security in power systems: application of neural networks to security assessment," University of Genova, 2008.
8. G. Battistelli, "Receding-horizon state estimation for discrete-time systems," University of Genova, 2004.
9. P. Coletta, "State estimation for hybrid systems: convergence, design, and applications," University of Genova, 2001.

Researcher and PhD Evaluation Committees

1. Member of the board of HDR (Habilitation à Diriger les Recherches) for the University of Lorraine, Nancy, France in 2016.
2. Member of final PhD evaluation committees: Université Paris-Saclay, Evry, France in 2023; Université Grenoble Alpes, Grenoble, France in 2022; Université d'Aix-Marseille, Marseille, France, Université de Lyon, Lyon, France and Université Grenoble Alpes, Grenoble, France in 2021; Imperial College, London, UK in 2020; Imperial College, London, UK, in 2019 and 2017; École Normale Supérieure de Lyon, Lyon, France, in 2015; École Supérieure d'Electricité (Supelec), Paris, France, in 2014; Delft University, Delft, Holland, in 2014.

Projects and Fundraising

1. In 2023, I got a research grant for the PRIN project "Optimal robust shape control for distributed parameter systems," which I am leading a *principal investigator* for a total amount of about 158K Euro, founded by NextGenerationEU. Motivated by the need to prevent from the occurrence of instability in the evolution of shapes and moving interfaces due to small noises and modelling uncertainties, the use of input-to-state stability will be addressed in a infinite-dimensional setting for the purpose of shape control, when dealing with nonlinear partial differential equations to model both fronts and physical processes behind the front dynamics such as for multi-phase systems.
2. In 2020, I obtained funds from *MESA Consulting* for the one-year project "Technological boost for efficient port terminal operations following safety related events" (10K Euro).

3. In 2015, I obtained a grant from AFOSR (*Air Force Office of Scientific Research*) as *principal investigator* for the project "New approach to the optimal control of level sets generated by partial differential equations to bridge the gap between computational mathematics and control of complex systems" over three years for about 240K US$.
4. In 2017, I obtained funds to participate the projects (i) "E-Navigation" for developing a PIM-track ship control and a collision avoidance system in collaboration with *Fincantieri* (35K Euro) and (ii) "ROSMANDITEN" to design the control system of escort tugs for the *Rossetti-Marino shipyard* in Ravenna, Italy (48K Euro).
5. In 2014, I obtained funds from *Fincantieri* for the project "ODESSA" to design a speed controller for a patrol ship of the Italian Coast Guard (20K Euro).
6. In 2009, I was charged by the Municipality of Genova for a project on the development of an unmanned aerial vehicle for urban video surveillance and environmental monitoring (37K Euro).
7. In 2003, as *principal investigator* I obtained funds for two projects of the Regional Programs of Innovative Action (PRAI) of the European Regional Development Fund (ERDF) about "Simulation, control and telecommunication networks for port terminal management" in collaboration with *Selex Communications* (111K Euro) and "Advanced learning on topics of numerical and dynamic simulation" in collaboration with *Ansaldo Energia* (301K Euro).
8. In 2003, I obtained a 10K-Euro fund for the project InMare, a "coordinated action" in cooperation with European leaders in the field of research and business activities on intermodal maritime transport, which was approved and financed by the European Union for the development of technologies and methodologies for safe, environmentally friendly and efficient shipping operations within *Framework Program 6*.
9. In 2003, I obtained a grant from the University of Genova for the development of a research activity in the field of telematics applied to freeway transport (10K Euro).
10. In 2000, I got a 12K-Euro fund for a research activity financed by CNR "Agenzia 2000," in cooperation with Prof. R. Zoppoli of the University of Genova, with Prof. T. Parisini of the University of Trieste, and Dr. M. Muselli of IEIIT-CNR of Genova. The title of the project is "New algorithms and methodologies for the approximate solutions of functional optimization nonlinear problems in a stochastic environment."
11. In 1998, I coordinated the Bilateral Agreement Italy/USA supported by ONR (*Office of Naval Research*) and CNR between IAN-CNR and the Center for Autonomous Underwater Vehicle Research of the Naval Postgraduate School (Monterey, California) about "Underwater robotic vehicles: detection, diagnosis, and recovery of fault," with a budget of 30K Euro over a period of two years.

Invited Talks

1. February 2023: " Stubborn and dead-zone redesign for state observers and dynamic output feedback," Technion, Haifa, Israel.
2. June 2022: "Moving-horizon estimation for switching systems, ANR HANDY Workshop on "Hybrid and Networked Dynamical Systems," ENSEEIHT (École nationale supérieure d'électrotechnique, d'électronique, d'informatique, d'hydraulique et des télécommunications) Toulouse, France.
3. June 2021: "Moving Horizon estimation for constrained and unconstrained systems," Centre de Recherche en Automatique de Nancy (ENSEM-CRAN), CNRS and Université de Lorraine, Nancy, France.
4. June 2021: "Observers for dynamic systems based on saturation and dead-zone output injections," Centre de Recherche en Automatique de Nancy (CRAN), Université de Lorraine, IUT Henri Poincaré, Longwy, France.

5. January 2021: "Level set methods and control: bridging the gap and prospect of future work," GipsaLab, CNRS and Université Grenoble Alpes, Grenoble, France.
6. January 2021: "Control of moving fronts using Hamilton-Jacobi PDEs," LAGEPP CNRS, Lyon, France.
7. November 2020: "Control of level sets arising from Hamilton-Jacobi PDEs: experience versus theory," Technion, Haifa, Israel.
8. April 2019: "Moving horizon methods for constrained and unconstrained estimation of dynamic systems," Laboratoire d'Informatique et des Systèmes (LIS), Université de Toulon, France.
9. January 2019: "Moving horizon estimation for linear, nonlinear, and switching systems," Centre de Recherche en Automatique de Nancy (CRAN), Université de Lorraine, IUT Henri Poincaré, Longwy, France.
10. February 2014: "High-gain and increasing-gain observers for nonlinear systems," Faculty of Mechanical, Maritime and Materials Engineering, TU Delft, Holland.
11. February 2012: "Optimal control for lumped parameter systems," Department of Mathematics, University of Genoa, Italy.
12. July 2003: "Luenberger observer for switching systems," Department of Electrical and Automation Engineering, University of Pisa, Italy.

Research Activity

I have focused my study and scientific activity along five main lines of research: (i) state estimation, (ii) parameter identification, (iii) fault diagnosis, (iv) neural networks and machine learning, and (v) optimal/predictive control and optimization methods. In the following, I will briefly describe my contributions, while referring only to the papers published in international journals for the sake of brevity.

As far as state estimation is concerned, I have devoted a special attention to systems that, in general, are nonlinear in terms of dynamic and measurement equations (possibly corrupted by noise), with inaccessible state variables. As a result of my graduate thesis, I have proposed an approach to estimation over a finite horizon and later I have extended it to infinite horizon with a moving window and an on-line adaptive tuning [J72], [J69], which is popularly referred in the recent literature as moving-horizon estimation. I have sought the analytical structure of the functions determining the optimal estimates. These functions can be approximated by means of neural networks and learning algorithms with off-line and on-line training. Then I have proved the stability of estimation error under suitable conditions, including observability of course [J71]. These conditions require a special kind of training based on min-max optimization. Such difficulties do not apply to a linear case. Thus, I have studied the problem for time-invariant linear systems [J63] and found the exact analytical solution and a design method based on linear matrix inequalities (LMIs) [J61]. As compared with [J71], in [J49], [J39] I have established new, more general, and less conservative conditions in a discrete-time nonlinear setting. This approach to state estimation has been reformulated for uncertain and switching linear systems in [J59], [J36], [J31] and [J58], [J50], [J40], respectively. Recently, in [J4] moving-horizon estimation has been investigated for linear parameter varying (LPV) systems.

Based the concept of "quadratic boundedness," I have faced the problem to design Luenberger observers for uncertain linear systems by searching for a tradeoff between transient behavior and uncertainty robustness at regime [J57]. I have addressed also the use of fast techniques to perform moving-horizon estimation with few, on-line optimization steps with guarantees on the stability of the estimation error [J30], [J17] and the application of moving-horizon estimation to the detection of stable/unstable regime changes in flow dynamics [J9]. Recently, I have focused on robust moving-horizon estimation by investigating under which conditions the disturbance-to-error stability of the estimation error can be guaranteed in terms of input-to-state stability (ISS) [J2].

My past research efforts have been focused also on estimators for Lipschitz nonlinear continuous-time systems. In [J64], a sliding-mode estimator is proposed with a rigorous analysis of the stability of the estimation error. Moreover, a design method is presented that enables one to synthesize a sliding-mode filter that minimizes an upper bound on the asymptotic estimation error in the presence of bounded system and measurement noises. After deriving preliminary stability results presented in [J56], [J52], I have considered a Luenberger observer for a class of nonlinear systems in [J55], [J42], where the design is made using a neural network and optimizing its parameters. Using tools from functional analysis and approximation theory, the convergence issues of such approach are analyzed and discussed in [J53], [J47], [J41].

More recently, I have addressed the design of state observers based on a high-gain structure for continuous-time nonlinear systems by using Lyapunov functionals to prove the stability of the estimation error [J34], [J32], [J15]. Hybrid observers with gain switching have been investigated in [J8]. Distributed observers for linear system subject to communication switching topologies are considered in [J5]. Observers for the purpose of output feedback control are studied in [J33], [J10]. In [J28] the so-called "stubborn observer" with an intrinsic robustness to measurements affected by outliers has been proposed for linear systems. The design of the observers presented in [J34], [J32], [J33], [J28] can be efficiently accomplished by using LMIs. In [J12] the stubborn approach has been improved to address estimation for nonlinear systems by proving the ISS of the estimation error with respect to process and measurement disturbances for a wide class of estimators, including the extended Kalman filter. Moreover, a dead-zone adaptation of the output error injection has been proposed as well in [J12]. I have studied the ISS of the estimation error provided by observers for nonlinear Lipschitz [J14] and polynomial systems in [J19].

The merit of [J12] is to show that a large number of filters and observers with disturbance-to-error ISS properties can be systematically redesigned by using a saturation or a dead-zone nonlinearity with adaptive thresholds on the output injection term in such a way as to -while preserving ISS- reduce the sensitivity to measurement noises in different scenarios, e.g., impulsive disturbances or persistent noise such as sensor bias. The proposed redesign paradigm is detailed with particular attention to Luenberger observers, thus curiously motivating the successful design of nonlinear observers for linear systems. The results from [J28], [J12] have been used for the purpose of robust network synchronization [J25] and robust output dynamic feedback [J6].

As to the identification issue, I have investigated parameter estimation problems by using different kinds of models. The simplest ones are white-box models, for which classical techniques, like least squares ones, turn out to be more suitable. Specifically, in [J29] I have focused on the identification of mechanical models of biological systems. Grey-box models, like the model of the thermodynamics of a heater line for a thermo-electric power plant, are more complex [J68] and deserve a different treatment. Grey-box modelling means that there are both black boxes (complete uncertainty) and white boxes (only parameter uncertainty) for the various subsystems of the plant. The solution I have proposed in [J68] is based on the idea of a combined estimation of the unknown parameters and the structural uncertainties represented by means of neural networks with weights to be properly chosen. All the unknown parameters (both those related to the physical models and the weights of the neural networks) have been estimated by applying a stochastic approximation technique that does not require the use of derivatives of the cost function. I have considered the approximate solution of nonlinear least-squares problems in [J51], [J46], where convergence conditions are provided. Recently, I have investigated the application of least-squares methods to detect change of regime in fluid flows [J26] and fire propagation [J11].

I have faced fault diagnosis according to the model-based paradigm. As for control and estimation, nonlinearity prevents one from solving this problem in an analytical way. The basic issue of fault detection is to generate residuals and fault signals, i.e., variables oversensitive to the occurrence of faults. I have proposed solutions based on both the extended Kalman filter [J66] and neural networks [J62], [J60] with successful applications to underwater robotics. I have investigated the use of state observer designed by relying on the previously mentioned "quadratic boundedness" for the purpose of fault estimation and detection of plants described by piecewise linear models [J13].

In the research area of machine learning, function approximation is a powerful paradigm to address

numerous functional optimization problems for which exact analytical solutions are unknown. In this context, the use of efficient algorithms to find the optimal weights of neural networks for the purpose of learning is crucial. I have proposed an optimization-based neural-training method with convergence and robustness properties in [J65]. Comparisons with other well-established training techniques show the great advantages of this approach and the possibility of applying it to problems of machine learning. As to the issues concerning the trapping into local minima, I have performed a simulation-based comparison between feedforward sigmoidal neural networks and polynomial approximators [J45]. The performances of the neural training based on the extended Kalman filter are analyzed in [J1] regarding robustness to minima local trapping and also in comparison with the theoretical Cramér-Rao bound on the speed of convergence.

The optimal control of nonlinear systems affected by uncertainties due to noise is a hard problem to address. First, I have addressed freeway optimal control problems by using a simple Monte Carlo technique. Traffic is described by a macroscopic model and optimization is applied to cost functions with different control actions, like ramp metering and variable-speed signalling [J67]. Optimization is performed by the Powell method, since the computation of the Monte Carlo cost function is heavy and the use of derivatives of this cost is prohibitive. The results of the optimal control are a reduction in congestion and a more effective exploitation of freeway transport capability [J70]. Optimal control has been successfully applied to the solution of logistic problems for the management of container terminals by using various models and control strategies such as predictive control [J54], [J48], [J44], [J35]. Other fields of interest are the inventory control for distribution chains [J38] by using a worst-case min-max approach and the optimal control of distributed parameter systems [J37]. I have investigated the optimal control of moving fronts generated by normal flow equations [J27], [J23], [J7], [J16] and the control of systems described by parabolic PDEs [J21]. Output boundary observers for hyperbolic distributed parameter systems have been studied in [J22]. Another field of application concerns the control of ships with particular attention to maneuvering and tracking [J24], [J3].

Publications

Articles Published in International Journals

[J1] A. Alessandri, M. Gaggero, M. Sanguineti, "Data-driven performance evaluation of neural learning based on extended Kalman filter," *Int. Journal of Adaptive Control and Signal Processing*, under review.

[J2] A. Alessandri ,"Robust moving-horizon estimation for nonlinear systems with perfect and imperfect optimization," *Automatica*, under review.

[J3] B. Piaggio, V. Garofano, S. Donnarumma, A. Alessandri, R. Negenborn, M. Martelli, "Follow-the-leader guidance, navigation and control of surface vessels: Design and experiments," *IEEE Journal of Oceanic Engineering*, to appear.

[J4] D. Bouhadjra, A. Alessandri, P. Bagnerini, A. Zemouche, "Moving horizon estimation of Amnioserosa cell dynamics during Drosophila dorsal closure," *European Journal of Control*, vol. 72, pp. 100829, 2023.

[J5] G. Yang, H. Rezaee, A. Alessandri, T. Parisini, "State estimation using a network of distributed observers with switching communication topology," *Automatica*, vol. 147, pp. 110690, 2023.

[J6] S. Tarbouriech, A. Alessandri, D. Astolfi, L. Zaccarian, "LMI-based stubborn and dead-zone redesign in linear dynamic output feedback," *IEEE Control Systems Letters*, vol. 7, pp. 187-192, 2022.

[J7] A. Alessandri, P. Bagnerini, M. Gaggero, L. Mantelli, V. Santamaria, A. Traverso,"Black-box modeling and optimal control of a two-phase flow using level set methods," *IEEE Trans. on Control Systems Technology*, vol. 30, pp. 520-534, 2022.

[J8] A. Alessandri, R. Sanfelice,"Hysteresis-based switching observers for linear systems using quadratic boundedness," *Automatica*, vol. 136, pp. 109982, 2022.

[J9] A. Alessandri, P. Bagnerini, M. Gaggero, D. Lengani, D. Simoni, "Detection of flow regime transitions using dynamic mode decomposition and moving horizon estimation," *IEEE Trans. on Control Systems Technology*, vol. 29, pp. 1324-1331, 2021.

[J10] A. Alessandri, F. Bedouhene, D. Bouhadjra, A. Zemouche, P. Bagnerini, "Observer-based control for a class of hybrid linear and nonlinear systems," *Discrete and Continuous Dynamical Systems, Series S*, vol. 14, p. 1213-1231, 2021.

[J11] A. Alessandri, P. Bagnerini, M. Gaggero, L. Mantelli, "Parameter estimation of fire propagation models using level set methods," *Applied Mathematical Modelling*, vol. 92, pp. 731-747, 2021.

[J12] D. Astolfi, A. Alessandri, L. Zaccarian, "Stubborn and dead-zone redesign for nonlinear observers and filters," *IEEE Trans. on Automatic Control*, vol. 66, pp. 667-682, 2021.

[J13] A. Alessandri, F. Boem, "State observers for systems subject to bounded disturbances using quadratic boundedness," *IEEE Trans. on Automatic Control*, vol. 65, pp. 5352-5359, 2020.

[J14] A. Alessandri, P. Bagnerini, R. Cianci, "State observation for Lipschitz nonlinear dynamical systems based on Lyapunov functions and functionals," *Mathematics*, vol. 8, no. 9, 2020.

[J15] H. Arezki, A. Zemouche, F. Bedouhene, A. Alessandri, "State observer design method for a class of non-linear systems," *IET Control Theory & Applications*, vol. 14, pp. 1648-1655, 2020.

[J16] A. Alessandri, P. Bagnerini, M. Gaggero, A. Rossi, "State and observer-based feedback control of normal flow equations," *Automatica*, vol. 117, pp. 108980, 2020.

[J17] A. Alessandri, M. Gaggero, "Fast moving horizon state estimation for linearly constrained discrete-time systems," *Int. Journal of Adaptive Control and Signal Processing*, vol. 34, pp. 706-720, 2020.

[J18] A. Alessandri, G. Battistelli, "Moving horizon estimation: Open problems, theoretical progress, and new application perspectives," *Int. Journal of Adaptive Control and Signal Processing*, vol. 34, pp. 703-705, 2020.

[J19] A. Alessandri, "Lyapunov functions for state observers of dynamic systems using Hamilton-Jacobi inequalities," *Mathematics*, vol. 8, no. 2, 2020.

[J20] A. Alessandri, "On Hamilton-Jacobi approaches to state reconstruction for dynamic systems," *Advances in Mathematical Physics*, vol. 2020, 2020.

[J21] A. Alessandri, P. Bagnerini, R. Cianci, S. Donnarumma, A. Taddeo, "Stabilization of diffusive systems using backstepping and the circle criterion," *Int. Journal of Heat and Mass Transfer*, vol. 149, pp. 1-10, 2020.

[J22] A. Alessandri, P. Bagnerini, R. Cianci, R. Revetria, "Transport and balance equations with boundary values problems for modeling and estimation of thermal flows," *Advances in Mathematical Physics*, vol. 2020, 2020.

[J23] A. Alessandri, P. Bagnerini, R. Cianci, M. Gaggero, "Optimal propagating fronts using Hamilton-Jacobi equations," *Mathematics*, vol. 7, no. 11, 2019.

[J24] A. Alessandri, S. Donnarumma, M. Martelli, S. Vignolo, "Motion control for autonomous navigation in blue and narrow waters using switched controllers," *Journal of Marine Science and Engineering*, vol. 7, no. 6, 196, 2019.

[J25] G. Casadei, D. Astolfi, A. Alessandri, L. Zaccarian, "Synchronization in networks of identical nonlinear systems via dynamic dead zones,"*IEEE Control Systems Letters*, vol. 3, pp. 667-672, 2019.

[J26] A. Alessandri, P. Bagnerini, M. Gaggero, D. Lengani, D. Simoni, "Dynamic mode decomposition for the inspection of three-regime separated transitional boundary layers using a least squares method," *Physics of Fluids*, vol. 31, pp. 044103-1–044103-13, 2019.

[J27] A. Alessandri, P. Bagnerini, M. Gaggero, "Optimal control of propagating fronts by using level set methods and neural approximations," *IEEE Trans. on Neural Networks and Learning Systems*, vol. 30, pp. 902-912, 2019.

[J28] A. Alessandri, L. Zaccarian, "Stubborn state observers for linear time-invariant systems," *Automatica*, vol. 88, pp. 1-9, 2018.

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Conference Articles

I am the author of more than 150 articles presented at international conferences (16 of them have been presented at invited sessions). Please look at

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