

## Personal information

Surname(s) / First name(s) **PhD. Festa, Adriano**  
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## Research themes

**Analysis and Numerics of PDE, High Performances Computing.**  
**Optimal control, Multi-agents systems, Mean-field models,**

## Working Experiences

26/07/2019 - **RTDb** (Researcher - Tenure track), Politecnico di Torino, Italia  
01/11/2018 - 25/07/2019 **RTDa** (Researcher), Università dell'Aquila, Italia  
01/12/2016 - 30/10/2018 **Post-Doc** Researcher, INSA, LMI, Rouen, France  
01/12/2014 - 30/11/2016 **Post-Doc** Researcher, RICAM, Austrian Academy of Science, Linz, Austria  
15/11/2013 - 15/11/2014 **Post-Doc** Researcher, ENSTA ParisTech, Paris, France  
19/03/2012 - 18/09/2013 **Experienced** Researcher, Imperial College London, EEE Department, UK.  
01/09/2008 - 01/02/2009 **Computer programmer**, stage. Infobyte s.p.a., Digital products for Broadcasting, <http://www.infobyte.it>

## Visiting periods

2018 **PUC-Ponteficia Universidade Catolica de Rio, Rio de Janeiro, Brazil.** (collaboration with A. Alla)  
19/01 - 3/02 2018 **Imperial College London.** (collaborazione con D. Kalise)  
15/09 2017 - 15/12/2017 **SCICOM**, University of Mannheim, Germany. (collaboration with S. Göttlich and M. Pfirsching)  
17-25/02 2017 **KAUST**, Jeddah, Saudi Arabia (collaboration with D. Gomes and R. Velho)  
13-19/03 and 19-23/09 2016 **Politecnico Turin**, Italy (collaboration with A. Tosin)  
01/06/2015 - 30/06/2015 **Sapienza University** of Rome, Italy (collaboration with F. Camilli and M. Falcone)  
02/03/2013 - 18/09/2013 **CMAP**, École Polytechnique, Paris, France (Collaboration with J.F. Bonnans)

## Research projects

2018 **MOR – MFG project**, (Principal investigator), 'Model Order Reduction for Mean-Field Games'  
2016-2018 **M2NUM project**, (Research associate), Haute-Normandie Regional Council, Modélisation Mathématique: applications et simulations NUMériques pour les énergies renouvelables, l'éco-mobilité, l'imagerie et la physique.  
2018 **BOUM project**, (Principal investigator), 'Modèles de trafic multi-populations et dispositifs de prévision du trafic'  
2014-2016 **New Frontiers program** Austrian Academy of Sciences (OeAW) NST-001, (Research associate), Multi-scale modeling and simulation of crowded transport in the life and social sciences  
2012-2014 **ITN Marie Curie Actions FP7-PEOPLE-2010-ITN SADCO**, (MC-Research Fellow) Sensitivity Analysis for Deterministic Controller Design SADCO

## Teaching experiences

02 - 07/2018 **InterMaths, International Master Program, Parallel Computing** Master Class for the University of L'Aquila (60h), Italy  
01 - 2019 **PhD Course, Optimal control and Hyperbolic PDE** for the doctoral school of L'Aquila University (10h), Italy  
09 - 12/2018 **Applied Mathematics chair, (Visiting lecturer), Strategy and Games in Continuous Systems** for the master and doctoral school of the University of Mannheim (45h), Germany  
01/09 - 30/12 2017 **Numerical Analysis chair, (Visiting lecturer), Numerical methods for Hamilton Jacobi equations** for the master and doctoral school of the University of Mannheim (50h), Germany  
15/01 - 30/06 2017 **TD, (Tutor) Algèbre Linéaire** for the 1st year of degree in Engineering (39h), INSA, Rouen  
06/01 - 30/03 2014 **TD, (Tutor) Optimisation Quadratique** for the 1st year of degree in Engineering (30h), ENSTA, Palaiseau  
01/2013 **Introduction to Differential Games mini-course** for PhD students and Post-docs, Young Researchers Workshop on System Dynamics and Optimal Control SADCO, Funchal, Portugal  
01/10 - 20/12/2012 **Tutor Mathematics 2** for the second year of degree in Engineering (40h), ICL, London  
a.y. 2009-2010 **Tutor Numerical Methods for PDE** (Master 15h), Math. Dep. Sapienza University Rome, Italy

- a.y. 2009-2010 **Tutor** *Computer Science and Programming* (C++, 50h), Math. Dep. Sapienza Università di Roma, Italy  
 a.y. 2008-2009 **Tutor** *Numerical Analysis and programming* (1st 50h) Math. Dep. Sapienza Università di Roma, Italy

## Education

- January 2012 **Philosophiae Doctor** in *Mathematics*, Sapienza Università di Roma, Italy  
 Thesis: *Analysis and approximation of Hamilton-Jacobi equations with irregular data*  
 Keywords Viscosity solutions, Semilagrangian schemes, Error estimates, PDE on networks, Image processing.  
 Committee Profs. *M. Falcone (Supervisor)*, Antonio Siconolfi (President), Giovanni Russo, Hasnaa Zidani.
- February 2009 **Training course** in *Innovative methods for Graphics, Image processing and Multimedia and Geographical data*, Italia Lavoro, Programma FIXO - Azione 3  
 Keywords Image Processing, High Performances Programming, Data management.
- January 2008 **Master degree** in *Mathematics for Applications*, 110/110 cum Laude, Sapienza Università di Roma  
 Thesis: *Recent progresses on the Optical Flow problem*. Supervisor: *Prof. M. Falcone*
- September 2005 **Bachelor degree** in *Mathematics*, 110/110 cum Laude, Sapienza Università di Roma, Italy  
 Thesis: *Viscosity solutions and the SFS Problem*. Supervisor: *Prof. A. Siconolfi*

## Grants/awards

- 2018 **MOR – MFG project**, (Principal investigator), 'Model Order Reduction for Mean-Field Games' funded by Brazilian-French Network in Mathematics (~ 2.5k Eur)
- 2017 **BOUM grant** obtained through a competitive call as P.I. of the project 'Modèles de trafic multi-populations et dispositifs de prévision du trafic' co-funded by SMAI and INSA (2k Eur)
- 2014 **Financial support** to attain HYP14 (Rio, Brasil) funded by IMPA (1k Eur)
- 2012-2013 Post Doc Fellowship **ITN Marie Curie Actions**, Sensitivity Analysis for Deterministic Controller Design SADCO, <http://itn-sadco.inria.fr/>
- 2009-2011 Doctoral Scholarship at Sapienza Università di Roma, Italy
- 2002 Best new students award in Mathematics, Sapienza Università di Roma

## Responsibilities

- Reviewer** for IEEE Trans. Control Syst. Technol., IEEE-CDC Proceedings, Discrete Cont. Dyn.-A, Automatica, Math. Comput. Model. Dyn. Syst., ZbMath, MathSciNet, SIAM J. Num. Math, Appl. Math. Opt., Rev. Cont. Letters, Num. Math., Comput. Math. Appl., Adv. Comput. Math.
- 2019 **Organizer** of the special session "Mean Field Games and Application" at the ICIAM 2019 Valencia with F. Silva and D. Tonon.
- 2019 **Organizer** of the ASCANA (l'Aquila Seminars in Control, Automation and Numerical Analysis) with M. Palladino and G. Pola.
- 28-29/03/2019 **Organizer** of the 2 days workshop "Control theory and Applications" at GSSI L'Aquila with M. Palladino, A. Marigonda and R. Guglielmi.
- 5-9/10/2019 **Organizer** of the 5 days autumn school + workshop "Rencontres Normandes sur les aspects theoriques et numeriques des EDP" at INSA Rouen with L. Baffico, G. Croce, N. Forcadel, O. Guibé, F. Luddens, A. Tonnoir.
- 2018 **Organizer** of the the special session "Modeling and optimization of networked systems" at the IFIP-2018 Essen with S. Goettlich and S. Knapp.
- 2018 **Organizer** of the the special session "Mean Field Games: from theory to applications" at the AIMS-2018 Taipei with D. Tonon and F. Silva.
- 2017 **Organizer** of the mini-symposium "Numerical Approximation and Optimization of Agent-based Models" at the 27th Biennial Numerical Analysis Conference in Glasgow, June 2017 with D. Kalise.
- 2016 **Organizer** of the special session "Recent developments of Mean Field Games and applications" at AIMS-2016 Orlando with D. Tonon.
- 2014 - 2016 **Organizer** of Radon Group Seminars <http://www.ricam.oeaw.ac.at/events/>
- 2013 - 2014 **Organizer** of the Seminars for the GdT COMMANDS, <http://commands.saclay.inria.fr/seminar>
- 2011 - 2012 **Organizer** of the Seminars "Modellistica Differenziale Numerica", Rome, <http://www1.mat.uniroma1.it/ricerca/seminari/mdn/>
- 2015 - 2016 Associated **Editor** of "Optimal Control: Novel Directions and Applications" for Lectures Notes, Springer 2017.

## List of Publications

- AF, R. Ferretti **18.** *Optimal route planning for sailing boats: a hybrid formulation.* (online first) *J. Optim. Theory and Appl.* (2019).
- AF, M. Pfirsching, S. Göttich **17.** *A model for a network of conveyor belts with various speed and capacity.* *Net. Het. Med.* 14(2), 389–410, (2019).
- AF, S. Göttich **16.** *A Mean Field Games approach for multi-lane traffic management.* *IFAC-PapersOnLine* 51(32), pp. 793–798, (2018).
- AF, D. Gomes, R. Velho. **15.** *An Adjoint-based Numerical Method for a class of nonlinear Fokker-Planck Equations.* in *PDE Models for Multi-Agent Phenomena*, Ed. P. Cardaliaguet, A. Porretta, F. Salvarani pp. 73–92 (2018).
- AF **14.** *A domain decomposition based parallel version of the Howard's Algorithm,* *Math. Comput. Simul.* 147, 121–139 (2018).
- AF, A. Tosin, MT. Wolfram **13.** *Kinetic description of collision avoidance in pedestrian crowds by sidestepping.* *Kin. Relat. Mod.* 11(3) 491–520, (2018).
- F. Bonnans, AF **12.** *Error estimates for the Euler discretization of an optimal control problem with a first-order state constraint.* *SIAM J. Numer. Anal.*, 55(2) 445–471, (2018).
- E. Carlini, AF, F. Silva **11.** *The Hughes model for pedestrian dynamics and congestion modelling,* *IFAC-PapersOnLine.* 50 (1), 1655–1660 (2017).
- AF, A. Picarelli, C. Hermosilla, F. Silva, R. Guglielmi **10.** *Hamilton–Jacobi–Bellman equations.* "Optimal Control Design: Novel Directions and Applications", M. S. Aronna, D. Kalise, D. Tonon Eds., (124 pp.) Lectures notes, Springer, 2017.
- F. Camilli, AF, S. Tozza **9.** *A discrete Hughes' model for pedestrian flow on graphs.* *Net. Het. Med.* 12(1) 93–112 (2017).
- E. Carlini, AF, F. Silva, MT. Wolfram **8.** *Semi-Lagrangian scheme for a modified version of the Hughes model for pedestrian flow.* *Dyn. Games Appl.*, 1–23, (2016).
- AF **7.** *Reconstruction of Independent Sub-Domains for a class of Hamilton Jacobi Equations and its Application to Parallel Computing,* *ESAIM:M2AN* 50(4), 1223–1240, (2016).
- AF, R. Vinter **6.** *Decomposition of Differential Games with Multiple Targets,* *J. Optim. Theory Appl.* 169(3), 848–875 (2016).
- AF, MT. Wolfram **5.** *Collision avoidance in pedestrian dynamics,* *Proceedings of 54nd IEEE Control and Decision Conference (CDC),* 3187–3192, (2015).
- AF, M. Falcone **4.** *An approximation scheme for an Eikonal Equation with discontinuous coefficient,* *SIAM J. Num. Anal.*, 52(1) 236–257 (2014).
- F. Camilli, AF, D. Schieborn **3.** *Shortest paths and Eikonal equations on a graph.* *Appl. Numer. Math.* 73 33–47 (2013).
- AF, R. Vinter **2.** *A decomposition technique for pursuit evasion games with many pursuers,* *Proceedings of 52nd IEEE Control and Decision Conference (CDC),* 5797–5802, (2013).
- E. Carlini, M. Falcone, AF **1.** *A brief survey on semi-Lagrangian schemes for Image Processing* Chapter of *Innovations for Shape Analysis: Models and Algorithms* Series: Mathematics and Visualization, Breuss, Bruckstein, Maragos, Petros (Eds.) 2013, XXIII, 494 p. 228
- (NOTE: All articles included in this section are indexed on Scopus or WoS)

## Conference papers

- AF **II.** *Domain Decomposition based Parallel Howard's Algorithm,* *Proceedings of the The 21st International Symposium on Mathematical Theory of Networks and Systems,* 1795–1797 (2014). (with peer-review)
- AF, M. Falcone **I.**  *$L^1$  convergence of a SL scheme for the eikonal equation with discontinuous coefficient,* *Proceedings of the 14th International Conference on Hyperbolic Problems: Theory, Numerics and Applications,* 559–567 (2012). (with peer-review)

## Dissertation

- AF **I.** *Analysis and approximation of Hamilton-Jacobi equations on irregular data,* Phd Thesis, published by LAP LAMBERT Academic Publishing, Saarbrücken, Germany.

## Preprints

- AF **4\*.** *Policy iteration algorithm for mean field games.* ArXiv, (2018).
- AF, S. Cacace, R. Ferretti **3\*.** *Stochastic differential games and application to a match race problem.* ArXiv, (2018).
- AF, P. Goatin **2\*.** *Modeling the impact of on-line navigation devices in traffic flows.* ArXiv, (2018).
- AF, N. Forcadel, E. Carlini **1\*.** *A semi-Lagrangian scheme for Hamilton-Jacobi equations on networks and application to traffic flow models.* ArXiv, (2018).

(NOTE: The publications marked with \* are preprints available on ArXiv submitted for publication.)

## Contributions in Workshops

14-16/03/2018	Reunion ANR Mean Field Games, Tours, France.
4-9/06/2017	Journées SMAI 2017, La Rochelle, France.
23/03/2016	Journées SMAI-MODE 2016, ENSEEIHT, Toulouse, France.
16/11/2015	Workshop on Optimal Control of Partial and Ordinary Differential Equations, Ecole Polytechnique, Palaiseau, France.
29/1-31/01/2014	SADCO-WIAS Young Research Workshop, Berlin, Germany
27/1-28/1/2014	Industrial Workshop on "Safety Systems, Driver Assistance and Optimal Control", Wolfsburg, Germany
9/9-13/9/2013	OMPC13, Summer school and workshop on optimal and model predictive control, Bayreuth, Germany
21/12-23/01/2013	Young Researchers Workshop on System Dynamics and Optimal Control SADCO, Funchal, Portugal
12/12-14/14/2012	Workshop: Around Viability Boundaries, UPMC, Paris, France
03/09-07/09/2012	SADCO Summer school and Workshop, New Trends in Optimal Control, Ravello, Italy
25/06-29/06/2012	14th International Conference on Hyperbolic Problems, Padova, Italy
30/05-02/06/2012	12th Viennese Workshop on Optimal Control and Dynamic Games, UT, Wien, Austria
05/09-09/09/2011	SADCO Summer School and Workshop, Imperial College, London, UK
04/07-08/07/2011	Workshop, OPTPDE - Challenges in Applied Control and Optimal Design, BCAM, Bilbao, Spain
02/03-04/03/2011	Workshop Aerospace applications of control and optimization, Eads-Astrium, ENSTA, France
13/02-18/02/2011	Advancing numerical methods for viscosity solutions and applications, BIRS, Banff, Alberta, Canada

## Selected presentations

24/07/2018	<i>Hamilton-Jacobi equations on networks and traffic flow models.</i> IFIP TC 7 Conference on System Modelling and Optimization, Essen.
11/07/2018	<i>A discrete Hughes model for pedestrian flow on graphs.</i> SMB18, Annual Meeting of the Society for Mathematical Biology & the Japanese Society for Mathematical Biology, Sydney, Australia.
07/07/2018	<i>Optimal Routing for Sailing Boats.</i> AIMS18, 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan.
06/07/2018	<i>Collision Avoidance for Pedestrian Dynamics.</i> AIMS18, 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan.
12/02/2018	<i>Conveyor Belts models.</i> Seminario di Modellistica differenziale, Sapienza University of Rome, Italy.
21/09/2017	<i>Collision Avoidance in Pedestrian Dynamics.</i> Scientific Computing Research Seminar, University of Mannheim, Germany.
10/07/2017	<i>Error bounds for first order constrained optimal control problems.</i> Control and application, SIAM Conference, Pittsburgh, USA.
04/07/2017	<i>Collision avoidance: Micro-macro models for pedestrians.</i> Seminars of the OPALE-INRIA group, Sophia Antipolis, France.
27/06/2017	<i>A semilagrangian numerical scheme for HJ equations on networks.</i> Biennial Numerical Analysis Conference, Strathclyde, Glasgow UK.
22/06/2017	<i>A hybrid control framework for route planning for sailing boats.</i> NUMOC17, Sapienza, Rome, Italy.
22/11/2016	<i>Independent domain decomposition for a class of Hamilton Jacobi equations.</i> Special Semester on Computational Methods in Science and Engineering, RICAM, Linz, Austria.
13/09/2016	<i>An Hybrid control approach for the sailing route planning problem.</i> SIMAI 16, Milano, Italy.
01/08/2016	<i>A Discrete Hughes Model for Pedestrian Flow on Graphs.</i> CMAM-7, Jyväskylä, Finland.
01/07/2016	<i>The Hughes model for pedestrian flow.</i> 11th AIMS Conf. DSDEA. Orlando, USA.
13/03/2016	<i>Semilagrangian schemes for macroscopic pedestrians models.</i> SMAI-MODE, Toulouse, France.
13/01/2016	<i>Pedestrian dynamics and collision avoidance..</i> WONAPDE, Concepcion, Chile.
17/12/2015	<i>Collision avoidance in collective behaviors.</i> EEE-CDC15, Osaka, Japan.
14/10/2015	<i>Fast techniques of resolution for Hamilton Jacobi equations.</i> ENUMATH 2015, Ankara, Turkey.
7/07/2015	<i>A parallel version of the Howard's iteration algorithm.</i> 2015 SIAM Conference on Control and Its Applications (CT15), Paris, France.
29/06/2015	<i>Domain Decomposition techniques for Hamilton Jacobi equations</i> 27th IFIP TC7 Conference 2015 on System Modelling and Optimization, Sophia Antipolis, France.
23/06/2015	<i>Independent Domain Decomposition for Hamilton-Jacobi equations</i> 26th Biennial Numerical Analysis Conference, Glasgow, UK.
23/03/2015	<i>Application of independent sub-domains reconstruction to parallel computing.</i> GAMM Lecce, ITALY.
15/05/2015	<i>Collision avoidance for pedestrian motion.</i> 13th Viennese Workshop on Optimal Control and Dynamic Games. Vienna, AUSTRIA.

- 5/12/2014 *Independent sub-domains reconstruction and parallel computing*. Numerical methods for PDEs: optimal control, games and image processing. Rome, ITALY.
- 09/2014 *Convergence a Discrete Optimal Control Problem with State Constraints* Cascais, Portugal.
- 08/2014 *Revisiting Domain Decomposition for HJ equations*, HYP14, Rio, Brasil.
- 07/2014 *Parallel Howard's Algorithm*, MTNS14, Groningen, Netherland.
- 06/2014 *Independent Domain Decomposition and Parallel Computing*, NetCo14, Tours, France.
- 03/2014 *A Parallel Version of Policy Algorithm*, SMAI-MODE, Rennes, France.
- 12/2013 *Decomposition technique for Multi-Agent Differential Games*, EEE-CDC, Florence, Italy.
- 11/2013 *Une technique de décomposition pour les jeux de poursuite avec joueurs multiples*, LMBA, Brest, FR.
- 09/2013 *Error Bounds for a Discrete Optimal Control Problem with State Constraints* 16th French-German-Polish Conference on Optimization, Krakov, Poland.
- 07/2013 *A decomposition technique for multi-agents Games*, SIAM Conference on Control and Its Applications, San Diego, USA.
- 03/2013 *Decomposing a Pursuit-Evasion Games with Multi-Pursuer*, COMMANDS seminars, ENSTA, Paris.
- 11/2012 *Pursuit-Evasion Games with Multi-Pursuer: a decomposition approach*, Numerical Modelling Seminar of Mathematics Department Guido Castelnuovo of Rome.
- 07/2012 *An approximation scheme for an Eikonal Equation with discontinuous coefficient*, HYP2012, 14th International Conference on Hyperbolic Problems, Università di Padova, Italy.
- 05/2012 *Differential Games that Decompose into a Family of Optimal Control Problems.*, 12th Viennese Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics. TU, Wien.
- 01/2012 *Analysis and approximation of Hamilton-Jacobi equations on irregular data*, Numerical Modelling Seminar of Mathematics Department Guido Castelnuovo of Rome.
- 09/2011 *Numerical Resolution of an Eikonal equation on a Graph*, SADCO Summer School and Workshop, Imperial College, London.
- 01/2010 *A fast algorithm for image registration*, Numerical Modelling Seminar of Mathematics Department Guido Castelnuovo of Rome
- 09/2008 *A novel functional for the Optical flow problem* Simai 9th Congress, Rome.
- 05/2008 *Recent develops on Optical Flow*, Numerical Modelling Seminar of Mathematics Department Guido Castelnuovo of Rome

### Personal skills and competences

Languages Italian (Mother tongue), English (C2), French (C1), German (A2)  
 Computer skills C/C++ - MPI - Java - Matlab - Mathematica - Maple

### Other activities

- 2009 - 2013 Professional Navigator on race sailing yachts: Ops5 Baltic 60, ReadyXsea X35, Black Wings Farr53.  
 International competitions: IOR world (2010, 2011, 2013), X35 Euro/world tourn.(2011, 2012, 2013).  
 2010 - 2013 Collaboration with North Sails – Centro Italia – assistance and dealing.