

Dr. Mattia Zanella

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Department of Mathematics
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Personal

Born on July 29th, 1987 in Ferrara (Italy).

Italian Citizen.

Research Interests

I work on uncertainty quantification and optimal control methods for kinetic equations with applications to collective phenomena in socio-economic and life sciences.

Education

- **PhD in Mathematics**, University of Ferrara.
Thesis: "Boltzmann-type and mean-field modeling of social dynamics: numerics, control, uncertainty quantification", advisor Prof. Lorenzo Pareschi.
Final grade: Approved cum laude.
PhD defense: April 4th, 2017.
- **Doctor Europaeus**, University of Ferrara.
- **Laurea Magistrale** in Mathematics, University of Milano, 2012.
Final grade: 110/110 cum laude.

Academic Positions

- **Assistant Professor** (tenure-track) in Mathematical Physics (SSD MAT/07) since November 2019
Ricercatore a Tempo Determinato di Tipo B
University of Pavia, Department of Mathematics "F. Casorati"
Via A. Ferrata, 27100, Pavia (Italy)
- **Assistant Professor** in Mathematical Physics (SSD MAT/07) August 2018 - October 2019
Ricercatore a Tempo Determinato di Tipo A
Politecnico di Torino, Department of Mathematical Sciences "G. L. Lagrange"
Corso Duca degli Abruzzi 24, 10129, Torino (Italy)
- **Postdoctoral Fellow** 2017-2018
Politecnico di Torino, Department of Mathematical Sciences "G. L. Lagrange"
Corso Duca degli Abruzzi 24, 10129, Torino (Italy)
Funding agency: Compagnia di San Paolo.

- **Research Assistant** 2012–2013
University of Milano, Department of Mathematics "F. Enriques"
Via Saldini 50, 20133, Milano (Italy)

Qualifications

National Scientific Qualification (ASN - Abilitazione Scientifica Nazionale) as Associate Professor in Mathematical Physics
Validity: July 13th, 2018 – July 13th, 2024

Awards

- "PhD Anile Prize 2018" of the Associazione Angelo Marcello Anile.
- "Nicolò Copernico Award 2018" for young PhD fellows distinguished for innovative thesis in sciences and technologies.

Visiting periods

- Hausdorff Research Institute for Mathematics, Research Program *Kinetic Theory*, May–August 2019.
- Institut Mittag–Leffler, Research Program *Mathematical Biology*, October 2018 (1 week).
- RWTH Aachen University (Prof. Michael Herty), November 2017 (1 week).
- University of Sussex (Prof. Bertram Düring), October 2017 (1 week).
- RWTH Aachen University (Prof. Michael Herty), May 2017 (2 weeks).
- Imperial College (Prof. José Antonio Carrillo), February–March 2016 (1 month).
- Institut Mittag–Leffler, Research Program *Interactions between Partial Differential Equations & Functional Inequalities*, October 2016 (1 week).
- RWTH Aachen University (Prof. Michael Herty), June 2015 (1 month).
- University of Wisconsin–Madison (Prof. Shi Jin), February–May 2015 (3 months)

Grants

- PRIN (Research Projects of Relevant National Interest), 2021–2023
Title: *Integrated Mathematical Approaches to Socio-Epidemiological Dynamics*
Role: Coordinator of the research unit of the University of Pavia
Grant: 465k€
- Institutional Horizon Europe Committee Unipv (INROAD+), 2020
Title: *High fidelity methods for model-based uncertainty quantification of emergent phenomena*, 2020.
Role: Principal investigator
Grant: 10k€

- INdAM GNCS Grant for Young Researchers, 2017
Title: *Uncertainty quantification and control for nonlinear nonlocal PDEs for aggregation–diffusion problems*
Role: Principal investigator
Grant: 1.2k€
- University of Ferrara 5x1000 Research Grant for Young Researchers, 2015
Title: *Uncertainty quantification and control for kinetic equations*
Role: Principal investigator
Grant: 4.5k€
- INdAM GNCS Research Project, 2018
Title: *Metodi numerici per problemi di controllo multiscala e applicazioni*
Role: Participant
- DAAD–MIUR Joint Mobility Program 2017–2018
Role: Participant
- INdAM GNCS Research Project, 2017
Title: *Metodi numerici per la quantificazione dell'incertezza in equazioni iperboliche e cinetiche*
Role: Participant

Publications

Editor of Books

- G. Albi, S. Merino-Aceituno, A. Nota, M. Zanella (Eds.). *Trails in Kinetic Theory: Foundational Aspects and Numerical Methods*, SEMA-SIMAI Springer Series, vol. 25, Springer, Cham, 2021.
DOI: 10.1007/978-3-030-67104-4

Submitted Articles

- S3. A. Medaglia, G. Colelli, L. Farina, A. Bacila, P. Bini, E. Marchioni, S. Figini, A. Pichiecchio, M. Zanella. Uncertainty quantification and control of kinetic models for tumour growth under clinical uncertainties. Preprint [arXiv:2110.05814](https://arxiv.org/abs/2110.05814), 2021.
- S2. G. Dimarco, G. Toscani, M. Zanella. Optimal control of epidemic spreading in presence of social heterogeneity. Preprint [arXiv:2107.12180](https://arxiv.org/abs/2107.12180), 2021.
- S1. G. Dimarco, A. Tosin, M. Zanella, Kinetic derivation of Aw-Rascle-Zhang-type traffic models with driver-assist vehicles. Preprint [arXiv:2101.04066](https://arxiv.org/abs/2101.04066), 2021.

Journal Articles

- 34. R. Borsche, A. Klar, M. Zanella. Kinetic-controlled hydrodynamics for multilane traffic models. *Physica A: Statistical Mechanics and its Applications*, in press.
DOI: 10.1016/j.physa.2021.126486
- 33. G. Albi, L. Pareschi, M. Zanella. Modelling lockdown measures in epidemic outbreaks using selective socio-economic containment with uncertainty. *Mathematical Biosciences and Engineering*, 18(6): 7161–7190, 2021.
DOI: 10.3934/mbe.2021355
- 32. G. Toscani, M. Zanella. On a class of Fokker-Planck equations with subcritical confinement. *Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl.*, in press. Preprint [arXiv:2103.11146](https://arxiv.org/abs/2103.11146).

31. M. Zanella, C. Bardelli, G. Dimarco, S. Deandrea, P. Perotti, M. Azzi, S. Figini, G. Toscani. A data-driven epidemic model with social structure for understanding the COVID-19 infection on a heavily affected Italian Province. *Mathematical Models and Methods in Applied Sciences*, in press.
DOI:10.1142/S021820252150055X.
30. G. Dimarco, B. Perthame, G. Toscani, M. Zanella. Kinetic models for epidemic dynamics with social heterogeneity. *Journal of Mathematical Biology*, 83, 4, 2021.
DOI:10.1007/s00285-021-01630-1
29. L. Pareschi, T. Trimborn, M. Zanella. Mean-field control variate methods for kinetic equations with uncertainties and applications to socio-economic sciences. *International Journal for Uncertainty Quantification*, to appear.
DOI:10.1615/Int.J.UncertaintyQuantification.2021037960
28. G. Albi, L. Pareschi, M. Zanella. Control with uncertain data of socially structured compartmental epidemic models. *Journal of Mathematical Biology*, 82, 63, 2021.
DOI:10.1007/s00285-021-01617-y
27. N. Loy, M. Zanella. Structure preserving schemes for Fokker-Planck equations with nonconstant diffusion matrices. *Mathematics and Computers in Simulation*, 188: 342-362, 2021.
DOI:10.1016/j.matcom.2021.04.018
26. M. Zanella, C. Bardelli, M. Azzi, S. Deandrea, P. Perotti, S. Silva, E. Cadum, S. Figini, G. Toscani. Social contacts, epidemic spreading and health system. Mathematical modeling and applications to COVID-19 infection. *Mathematical Biosciences and Engineering*, 18(4): 3384-3403, 2021.
DOI:10.3934/mbe.2021169
25. L. Preziosi, G. Toscani, M. Zanella. Control of tumour growth distributions through kinetic methods. *Journal of Theoretical Biology*, 514: 110579, 2021.
DOI:10.1016/j.jtbi.2021.110579.
24. L. Pareschi, M. Zanella. Monte Carlo stochastic Galerkin methods for the Boltzmann equation with uncertainties: space-homogeneous case. *Journal of Computational Physics*, 423: 109822, 2020.
DOI:10.1016/j.jcp.2020.109822
23. B. Piccoli, A. Tosin, M. Zanella. Model-based assessment of the impact of driver-assist vehicles using kinetic theory. *Zeitschrift für Angewandte Mathematik und Physik*, 71:152, 2020.
DOI:10.1007/s00033-020-01383-9
22. E. Ballante, C. Bardelli, M. Zanella, S. Figini, G. Toscani. Economic segregation under the action of trading uncertainties. *Symmetry*, 12(9): 1390, 2020.
DOI:10.3390/sym12091390
21. G. Dimarco, L. Pareschi, G. Toscani, M. Zanella. Wealth distribution under the spread of infectious diseases. *Physical Review E*, 102: 022303, 2020
DOI:10.1103/PhysRevE.102.022303
20. G. Toscani, A. Tosin, M. Zanella. Kinetic modelling of multiple interactions in socio-economic systems. *Networks & Heterogeneous Media*, 15(3): 519-542, 2020.
DOI:10.3934/nhm.2020029
19. A. Tosin, M. Zanella. Uncertainty damping in kinetic traffic models by driver-assist controls. *Mathematical Control & Related Fields*, 11(3): 681-713, 2021.
DOI:10.3934/mcrf.2021018

18. J. A. Carrillo, M. Zanella. Monte Carlo gPC methods for diffusive kinetic flocking models with uncertainties. *Vietnam Journal of Mathematics*, 47(4): 931-954, 2019.
DOI:10.1007/s10013-019-00374-2
17. M. Zanella. Structure preserving stochastic Galerkin methods for Fokker-Planck equations with background interactions. *Mathematics and Computers in Simulation*, 168:28-47, 2020.
DOI:10.1016/j.matcom.2019.07.012.
16. G. Toscani, A. Tosin, M. Zanella. Multiple-interaction kinetic modelling of a virtual-item gambling economy. *Physical Review E*, 100(1):012308, 2019.
DOI:10.1103/PhysRevE.100.012308.
15. L. Pareschi, G. Toscani, A. Tosin, M. Zanella. Hydrodynamic models of preference formation in multi-agent societies. *Journal of Nonlinear Science*, 29(6):2761-2796, 2019.
DOI:10.1007/s00332-019-09558-z
14. A. Tosin, M. Zanella. Kinetic-controlled hydrodynamics for traffic models with driver-assist vehicles. *Multiscale Modeling & Simulation*, 17(2):716-749, 2019.
DOI:10.1137/18M1203766
13. G. Albi, L. Pareschi, M. Zanella. Boltzmann games in heterogeneous consensus dynamics. *Journal of Statistical Physics*, 175(1):97-125, 2019.
DOI:10.1007/s10955-019-02246-y
12. J. A. Carrillo, L. Pareschi, M. Zanella. Particle based gPC methods for mean-field models of swarming with uncertainty. *Communications in Computational Physics*, 25(2):508-531, 2019.
DOI:10.4208/cicp.0A-2017-0244
11. M. Herty, A. Tosin, G. Visconti, M. Zanella. Hybrid stochastic kinetic description of two-dimensional traffic dynamics. *SIAM Journal on Applied Mathematics*, 78(5):2737-2762, 2018.
DOI:10.1137/17M1155909
10. G. Toscani, A. Tosin, M. Zanella. Opinion modeling on social media and marketing aspects. *Physical Review E*, 98(2):022315, 2018.
DOI:10.1103/PhysRevE.98.022315
9. A. Tosin, M. Zanella. Boltzmann-type models with uncertain binary interactions. *Communications in Mathematical Sciences*, 16(4):962-984, 2018.
DOI:10.4310/CMS.2018.v16.n4.a3
8. L. Pareschi, M. Zanella. Structure preserving schemes for nonlinear Fokker-Planck equations and applications. *Journal of Scientific Computing*, 74(3):1575-1600, 2018.
DOI:10.1007/s10915-017-0510-z
7. P. Vellucci, M. Zanella. Microscopic modeling and analysis of collective decision-making: equality bias leads suboptimal solutions. *Annali dell'Università di Ferrara – Sezione VII Scienze Matematiche*, 64(1):185-207, 2018.
DOI:10.1007/s11565-017-0280-4
6. M. Herty, M. Zanella. Performance bounds for the mean-field limit of constrained dynamics. *Discrete and Continuous Dynamical Systems – Series A*, 37(4):2023-2043, 2017.
DOI:10.3934/dcds.2017086
5. L. Pareschi, P. Vellucci, M. Zanella. Kinetic models of collective decision-making in the presence of equality bias. *Physica A: Statistical Mechanics and its Applications*, 467:201-217, 2017.
DOI:10.1016/j.physa.2016.10.003

4. G. Albi, L. Pareschi, M. Zanella. Opinion dynamics over complex networks: kinetic modelling and numerical methods. *Kinetic and Related Models*, 10(1):1-32, 2017.
DOI: 10.3934/krm.2017001
3. D. Morale, M. Zanella, V. Capasso, W. Jaeger. Stochastic modelling and simulation of ion transport through channels. *Multiscale Modeling & Simulation*, vol. 14(1):113-137, 2016.
DOI: 10.1137/15M1010907
2. G. Albi, L. Pareschi, M. Zanella. Uncertainty Quantification in control problems for flocking models. *Mathematical Problems in Engineering*, vol. 2015, 14 pp., 2015.
DOI: 10.1155/2015/850124
1. G. Albi, L. Pareschi, M. Zanella. Boltzmann-type control of opinion consensus through leaders, *Philosophical Transactions of the Royal Society A: Mathematical Physical and Engineering Sciences*, 372(2028), 2014.
DOI: 10.1098/rsta.2014.0138

Book Chapters

5. G. Albi, G. Bertaglia, W. Boscheri, G. Dimarco, L. Pareschi, G. Toscani, M. Zanella. Kinetic modelling of epidemic dynamics: social contacts, control with uncertain data, and multiscale spatial dynamics. In *Predicting Pandemics in a Globally Connected World, Vol. 1*, Editors N. Bellomo and M. Chaplain, Springer-Nature. (Preprint arXiv:2110.00293)
4. M. Herty, A. Tosin, G. Visconti, M. Zanella. Reconstruction of traffic speed distributions from kinetic models with uncertainties. In *Mathematical descriptions of traffic flow: micro, macro and kinetic models*, Eds. G. Puppo, A. Tosin, SEMA-SIMAI Springer Series, vol 12, 2021.
DOI: 10.1007/978-3-030-66560-9_1
3. A. Tosin, M. Zanella. Boltzmann-type description with cutoff of Follow-the-Leader traffic models. In *Trails in Kinetic Theory: Foundational Aspects and Numerical Methods*, Eds. G. Albi, S. Merino-Aceituno, A. Nota, M. Zanella, SEMA-SIMAI Springer Series, vol. 25, pp. 227-251, 2021.
DOI: 10.1007/978-3-030-67104-4_8
2. G. Dimarco, L. Pareschi, M. Zanella. Uncertainty quantification for kinetic models in socio-economic and life sciences. In *Uncertainty Quantification for Hyperbolic and Kinetic Equations*, S. Jin, L. Pareschi Eds., SEMA SIMAI Springer Series, vol. 14, pp. 151-191, 2017.
DOI: 10.1007/978-3-319-67110-9_5
1. G. Albi, L. Pareschi, G. Toscani, M. Zanella. Recent advances in opinion modeling: control and social influence. In *Active Particles Volume 1. Advances in Theory, Models and Applications*, N. Bellomo, P. Degond, and E. Tadmor Eds., Birkhäuser-Springer, pp. 49-98, 2017.
DOI: 10.1007/978-3-319-49996-3_2

Proceedings

3. A. Tosin, M. Zanella. Control strategies for road risk mitigation in kinetic traffic modelling. *IFAC-PapersOnLine*, 51(9):67-72, 2018.
DOI: 10.1016/j.ifacol.2018.07.012
2. L. Pareschi, M. Zanella. Structure preserving schemes for mean-field equations of collective behavior. In: Klingenberg C., Westdickenberg M. (eds) *Theory, Numerics and Applications of Hyperbolic Problems II. HYP 2016*. Springer Proceedings in Mathematics & Statistics, vol 237, pp. 405-421, Springer, Cham.
DOI: 10.1007/978-3-319-91548-7_31

1. G. Albi, L. Pareschi, M. Zanella. On the optimal control of opinion dynamics on evolving networks. In *System Modeling and Optimization. CSMO 2015. IFIP Advances in Information and Communication Technology*, L. Bociu, J. A. Désidéri, A. Habbal Eds., vol. 494, Springer, Cham. DOI: 10.1007/978-3-319-55795-3_4

Interdisciplinary collaborations

3. J. Dibble, A. Prelorendjos, O. Romice, M. Zanella, E. Strano, M. Pagel, S. Porta. On the origin of spaces: Morphometric foundations of urban form evolution. *Environment and Planning B: Urban Analytics and City Science*, 46(4): 707–730, 2019. DOI: 10.1177/2399808317725075
2. J. Dibble, A. Prelorendjos, O. Romice, M. Zanella, E. Strano, M. Pagel, S. Porta. Urban morphometrics: Towards a science of urban evolution. *City as Organism: New Visions for Urban Life*, 2, pp. 1143–1154. Proceedings of the 22nd International Seminar on Urban Form, Rome.
1. A. Venerandi, M. Zanella, O. Romice, J. Dibble, S. Porta. Form and urban change – An urban morphometric study of five gentrified neighbourhoods in London. *Environment and Planning B: Urban Analytics and City Science*, 44(6): 1056–1076, 2017. DOI: 10.1177/0265813516658031.

Popularization

- Invited talk, "Modelli matematici come strumento decisionale: epidemie e comportamento collettivo", π –day Giornata Internazionale della Matematica, March 14th, 2021.
- M. Zanella, G. Toscani. Modelli matematici per controllare l’impatto sociale dell’epidemia. *Università di Pavia - Idee per Ripartire*, November 2020.
- A. Tosin, M. Zanella. La popolarità delle opinioni. *MaddMath - MaddSpot*, June 2018 (in Italian).
- G. Albi, M. Zanella. Manuale per un leader: strategie di controllo dell’opinione pubblica. *Gli Stati Generali*, May 2015 (in Italian).

Communications

Talks

41. June 2021 - Invited talk *Kinetic and Macroscopic Models for Epidemic Dynamics* - 8th European Congress of Mathematics, MS "PDE models in the Life and Social Sciences".
40. May 2021 - Contributed talk *Kinetic models for epidemic dynamics* - Conference "The Legacy of Carlo Cercignani: from Kinetic Theory to Turbulence Modeling", Politecnico di Milano, Italy.
39. May 2020 - Invited talk *Uncertainty quantification and control for emerging phenomena*- Electronic Spring Workshop "PhD in Computational Mathematics and Decision Sciences", University of Pavia, Italy.
38. December 2019 - Invited talk *Uncertainty quantification and control for collective phenomena* - Workshop "Emergent phenomena - from Kinetic Models to Social Hydrodynamics", part of the thematic program on "Quantum and Kinetic Problems: Modeling, Analysis, Numerics and Applications", Institute for Mathematical Sciences, National University of Singapore, Singapore.
37. November 2019 - Seminar *Uncertainty damping in the macroscopic forecast of vehicular traffic flow* - Laboratory SmartData@Polito, Politecnico di Torino, Italy.

36. September 2019 - Invited talk *Kinetic-controlled hydrodynamics* - XXI Congresso UMI (Unione Matematica Italiana), Section 8: "Fisica Matematica", University of Pavia, Italy.
35. September 2019 - Invited talk *Uncertainty damping in kinetic traffic models* - XXI Congresso UMI (Unione Matematica Italiana), Section 9: "Modelli e Applicazioni", University of Pavia, Italy.
34. July 2019 - Invited talk *Uncertainty damping in kinetic traffic modelling by driver-assist controls* - International Congress on Industrial and Applied Mathematics (ICIAM2019), MS "Mathematical descriptions of traffic flow: micro, macro and kinetic models for a complex phenomenon", Valencia, Spain.
33. July 2019 - Invited talk *Kinetic-controlled hydrodynamics* - International Congress on Industrial and Applied Mathematics (ICIAM2019), MS "Novel concepts in model-driven optimization and control of agent-based systems", Valencia, Spain.
32. June 2019 - Invited talk *Structure preserving gPC methods for kinetic equations with uncertainties* - 28th Biennial Numerical Analysis Conference, MS "Computational methods for model driven optimization and control under uncertainty", University of Strathclyde, Glasgow, UK.
31. May 2019 - Invited talk *Monte Carlo gPC methods for kinetic equations with uncertainties* - Workshop "Asymptotic methods and numerical approximations of multi-scale evolutions problems, and uncertainty quantification", ENS Rennes, France.
30. March 2019 - Invited talk *Uncertainty damping in kinetic models of collective phenomena* - Workshop "Control Theory and Applications", Gran Sasso Science Institute (GSSI), L'Aquila, Italy.
29. February 2019 - Invited talk *Kinetic-controlled hydrodynamics* - Workshop "Numerical methods for multiscale control problems and applications" University of Verona, Italy.
28. December 2018 - Invited talk *Uncertainty quantification for kinetic equations of collective behavior* - Workshop "Innovative Trends in the Numerical Analysis and Simulation of Kinetic Equations", Mathematisches Forschungsinstitut Oberwolfach, Germany.
27. November 2018 - Invited lecture *Uncertainty Quantification for kinetic equations of collective behavior* - Autumn School "From Interacting Particle Systems to Kinetic Equations: Modelling, Control & Numerical Methods", University of Verona, Italy.
26. October 2018 - Contributed talk *Control strategies for road risk mitigation in kinetic and hydrodynamic traffic modelling* - Conference Kinetic and Transport Equations: Mathematical Advances and Applications, University of Parma, Parma, Italy.
25. October 2018 - Invited talk *Control strategies for road risk mitigation in kinetic and hydrodynamic traffic modelling* - Workshop Problems in discrete dynamics: from biochemical systems to rare events, networks, clustering and related topics - IV Edition, Arcidosso, Italy.
24. September 2018 - Invited talk *Stochastic Galerkin methods for kinetic equations of collective behavior* - Joint Meeting UMI-SIMAI-PTM, Session "Advances in Kinetic Theory", Wroclaw, Poland.
23. July 2018 - Invited talk *Boltzmann games in heterogeneous consensus dynamics* - 28th IFIP TC7 Conference 2018, MS "Inverse problems and optimal control approaches in socio-economic applications", University of Duisburg-Essen, Germany.
22. July 2018 - Invited talk *Control strategies for road risk mitigation in kinetic and hydrodynamic traffic modelling* - 28th IFIP TC7 Conference 2018, MS "Modeling and optimization of networked systems", University of Duisburg-Essen, Germany.
21. May 2018 - Invited talk *Stochastic Galerkin methods for kinetic equations of collective behavior* - Workshop Kinetic Theory for Control, Games and Uncertainty, RWTH Aachen University, Aachen, Germany.

20. February 2018 - Invited talk *Uncertainty quantification for kinetic and mean-field equations* - Convegno Nazionale GNCS 2018, Montecatini Terme, Italy.
19. December 2017 - Department seminar *Uncertainty quantification and optimal control problems for multiagent systems* - Department of Mathematical Sciences G. L. Lagrange, Politecnico di Torino, Italy.
18. December 2017 - Invited talk *Opinion dynamics over kinetic networks* - SIAM Conference on Analysis of Partial Differential Equations, Baltimore, USA.
17. November 2017 - Invited talk *Hybrid stochastic kinetic description of 2D traffic dynamic* - The Finite Volume Schemes and Traffic Modeling in Besançon, Université Franche-Comte, Besançon, France.
16. November 2017 - Department seminar *Hybrid stochastic kinetic description of 2D traffic dynamics* - Department of Mathematics IGPM, RWTH Aachen University, Germany.
15. October 2017 - Department seminar *Uncertainty quantification for kinetic and mean-field equations* - Department of Mathematics, University of Sussex, Brighton, UK.
14. October 2017 - Invited talk *Opinion dynamics over kinetic networks* - Workshop Problems in discrete dynamics: from biochemical systems to rare events, networks, clustering and related topics - III Edition, Arcidosso, Italy.
13. September 2017 - Contributed talk *Uncertainty quantification for mean-field equations in social sciences* - XVII Italian Meeting on Hyperbolic Equations, University of Pavia, Pavia, Italy.
12. June 2017 - Invited talk *Opinion dynamics over kinetic networks* - 27th Biennial Numerical Analysis Conference, University of Strathclyde, UK.
11. May 2017 - Contributed talk *Structure preserving methods for mean-field equations with random inputs* - Warwick EPSRC Symposium: Emerging PDE models in Socio-Economic Sciences, University of Warwick, UK.
10. May 2017 - Department seminar *Structure preserving methods for mean-field equations with random inputs* - Department of Mathematics, RWTH Aachen University, Aachen, Germany.
9. April 2017 - Invited lecture *Structure preserving methods for mean-field equations with random inputs* - School on Uncertainty Quantification for Hyperbolic Equations and Related Topics, GSSI, L'Aquila, Italy.
8. March 2017 - Invited talk *Uncertainty quantification for kinetic equations in socio-economic sciences* - SIAM CS&E 2017 Conference, Atlanta, USA.
7. July 2016 - Contributed talk *Uncertainty quantification for kinetic models of collective behavior* - Summer School UQ for Applied Problems, Basque Center for Applied Mathematics (BCAM), Bilbao, Spain.
6. January 2016 - Invited talk *Modeling and control of opinion dynamics on networks* - International Workshop Kinetic Theory and Multiscale Phenomena: Modelling, Analysis and New Applications, Stellenbosch, South Africa.
5. December 2015 - Department Seminar *Stochastic multiscale modelling of ion transport across membranes* - Department of Mathematics, Politecnico di Milano, Milano, Italy.
4. June 2015 - Invited talk *Mean-field and Boltzmann control of socio-economic systems* - 27th IFIP TC7 Conference 2015, Sophia-Antipolis, France.
3. June 2015 - Department seminar *Uncertainty quantification in control problems for flocking models* - Department of Mathematics, RWTH Aachen University, Aachen, Germany.

2. March 2015 - Department seminar *Uncertainty quantification in control problems for flocking models* - Department of Mathematics, University of Wisconsin-Madison, Madison, USA.
1. March 2015 - Invited talk *Uncertainty quantification in control problems for flocking models* - SIAM CS&E 2015 Conference, Salt Lake City, USA.

Organization activity

- Minisymposium *Novel Approaches in the Mathematical Understanding of COVID-19 Epidemic*, SIMAI 2020+2021 Conference, September 2021, University of Parma, Italy.
(co-organizer Dr. Cinzia Soresina)
- Minisymposium *Recent Results in Kinetic Theory and Applications*, SIMAI 2020+2021 Conference, September 2021, University of Parma, Italy.
(co-organizer Dr. Giorgio Martalò)
- Electronic Workshop *Collective Models, Control and Uncertainty Quantification for Infectious Diseases and Related Problems*, April 2020.
(co-organizers Dr. Giacomo Albi, Prof. Giacomo Dimarco, Prof. Lorenzo Pareschi)
- Minisymposium *Computational Methods for Model-driven Optimization and Control under Uncertainty*, 28th Numerical Analysis Conference, June 2019, University of Strathclyde, Glasgow, UK.
(co-organizer Dr. Dante Kalise Balza)
- Summer School *Trails in Kinetic Theory: Foundational Aspects and Numerical Methods*, May 2019, Hausdorff Research Institute for Mathematics, Bonn, Germany.
(co-organizers Dr. Giacomo Albi, Dr. Sara Merino Aceituno, Dr. Alessia Nota)
- Workshop *Recent Trends in Kinetic Modelling and Related Fields*, Politecnico di Torino, October 2018, Politecnico di Torino, Italy.
(co-organizer Prof. Andrea Tosin)
- Special Session *Models and Numerical Methods in Kinetic Theory*, 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, July 2018, Taipei, Taiwan.
(co-organizers Prof. Giacomo Dimarco, Prof. Andrea Tosin)
- Conference *Numerical Aspects of Hyperbolic Balance Laws and Related Problems*, April 2018, University of Ferrara, Ferrara, Italy.
(co-organizers Dr. Giacomo Albi, Prof. Giacomo Dimarco)
- Conference *Numerical Aspects of Hyperbolic Balance Laws and Related Problems*, December 2015, University of Ferrara, Ferrara, Italy.
(co-organizers Prof. Giacomo Dimarco, Prof. Lorenzo Pareschi)

Referee Activity

I served as referee for the following journals:

Acta Applicandae Mathematicae • Aerospace Science & Technology • Analysis and Applications • Applied Mathematical Modelling • Applied Physics Reviews • Communications in Computational Physics • Communications in Mathematical Sciences • Communications in Nonlinear Science and Numerical Simulation • Computer & Mathematics with Applications • Discrete and Continuous Dynamical Systems • Entropy • Frontiers in Artificial Intelligence • International Journal of Automation and Computing • Journal of Computational Physics • Journal of Computational Science • Journal of Statistical Physics •

Kinetic and Related Models • Mathematical Biosciences and Engineering • Mathematics and Computers in Simulation • Mathematical Methods in the Applied Sciences • Mathematical Models and Methods in the Applied Sciences • Numerische Mathematik • Optimization and Engineering • Proceedings of the Royal Society A • SIAM Journal on Multiscale Modeling & Simulation • SIAM Journal on Numerical Analysis • SIAM Journal on Scientific Computing • Nonlinearity • Physica A • Physics Letters A • Philosophical Transactions of the Royal Society A • PLOS ONE • Proceedings of the Royal Society A • SEMA–SIMAI Springer Series.

Certified referee activity <https://publons.com/a/1271086/>.

Research Partnerships

- October 2020 – May 2021: research project "Mathematical modeling and statistics for the forecast of the Covid-19 epidemic in the territory of the Province of Pavia" between the University of Pavia and the Health Protection Agency (ATS) of Pavia.

Research Contracts

- Since March 2021 - research collaboration with Centre for Advanced Imaging and Radiomics, Fondazione Mondino, Istituto Neurologico Nazionale a Carattere Scientifico (IRCCS).

Boards

- Since May 2020 - member of the Scientific Committee of *Mathematics for Artificial Intelligence - MAIN 2021*, Politecnico di Torino, Italy.
- Since November 2020 - member of the board of the national group "Socio-Epidemic Modelling" of the Italian Mathematical Union (UMI).
- Since May 2020 - member of the board of PhD program in "Computational Mathematics and Decision Sciences" (XXXVI cycle), University of Pavia and University of Italian Switzerland (USI).
- 2019 - Referee of Research Projects for the University of Verona, Italy.
- 2019 - Member of the PhD thesis committee of Giovanni Dematteis, Politecnico di Torino (Italy). Thesis: "Large deviations for rare realizations of dynamical systems" (supervisor: Prof. Lamberto Rondoni).
- 2018 - Referee of Research Projects of High National Interest (PRIN) for the Italian Ministry of Education, University and Research.

Advisor of PhD Students

- Under way - Andrea Medaglia, PhD in Computational Mathematics and Decision Sciences, University of Pavia.
- Under way - Jonathan Franceschi, PhD in Computational Mathematics and Decision Sciences, University of Pavia.
- Under way - Emanuele Bernardi, PhD in Computational Mathematics and Decision Sciences, University of Pavia.

Advisor of Undergraduate Students

- Under way - Giulia Guicciardi, BSc in Mathematics, University of Pavia, Italy.
- September 2021 - Francesca Demarchi, MSc in Mathematics, University of Pavia, Italy. Thesis: "Teoria dell'informazione e disuguaglianze di entropia".
Co-supervised with Prof. Giuseppe Toscani (University of Pavia)
- July 2021- Emanuele Bernardi, MSc in Mathematics, University of Pavia, Italy.
Thesis: "Kinetic models for wealth distribution in presence of epidemic dynamics with asymptomatic cases".
Co-supervised with Prof. J. A. Carrillo (University of Oxford)
- May 2021 - Luca Alberti Archetti, IUSS Pavia, Italy.
Thesis: "On a kinetic model for epidemic spreading with reinfection based on social contacts: applications to the SARS-CoV-2 epidemic".
- April 2021 - Michele Mascherpa, MSc in Mathematics, University of Pavia, Italy.
Thesis: "Kinetic models for wealth distribution with taxation".
Co-supervised with Prof. Bertram Düring (University of Warwick), and Prof. Giuseppe Toscani (University of Pavia)
- October 2020 - Adele Ravagnani, MSc in Complex Systems, Politecnico di Torino, Italy.
Thesis: "Phase transition in vehicular traffic: a Boltzmann-type kinetic approach".
Co-supervised with Prof. Andrea Tosin (Politecnico di Torino)
- April 2020 - Andrea Medaglia, MSc in Physics, University of Milan, Italy.
Thesis: "Kinetic-controlled non-Maxwellian traffic models with driver-assist vehicles" .
Co-supervised with Prof. Davide Galli (University of Milan), and Prof. Andrea Tosin (Politecnico di Torino).
- March 2020 - Matteo Defilippi, MSc in Mathematical Engineering, Politecnico di Torino, Italy.
Thesis: "Virtual shaker testing of a large-size satellite with uncertainty quantification of the mechanical stiffness"
Co-supervised with Prof. Andrea Tosin (Politecnico di Torino)
External Company: Thales Alenia Space (representative: Dr. Eng. Pietro Nali)

Teaching

Holder of Undergraduate Courses

- Since March 2021: Mathematical Models in Applied Sciences, MSc in Geology, University of Pavia, Italy.
- Since November 2019: Mathematics, BSc in Geology, University of Pavia, Italy.
- October 2019: Probability & Statistics, MSc in Architecture, Politecnico di Torino, Italy.

Self-contained Mini Courses

- May 2019: *Numerical Methods for Kinetic Equations*, MSc in Mathematical Engineering, Politecnico di Torino, Italy.
- April 2017–May 2017: *An Introduction to Numerical Methods for Stochastic Computations*, MSc in Mathematics, University of Ferrara, Italy

- April 2016–May 2016: *Stochastic Calculus and Financial Markets: Laboratory of Numerical Methods*, MSc in Mathematics, University of Ferrara, Italy.
- April 2015–May 2015: *Stochastic Calculus and Financial Markets: Laboratory of Numerical Methods*, MSc in Mathematics, University of Ferrara, Italy.

Teaching Assistant in Undergraduate Courses

- March 2019–June 2019: Rational Mechanics, BSc in Civil Engineering, Politecnico di Torino.
- October 2018–January 2019: Calculus, MSc in Architecture, Politecnico di Torino.
- October 2016–December 2016: Calculus I, MSc in Architecture, University of Ferrara.
- September 2016–December 2016: Continuous Mechanics, MSc in Mathematics, University of Ferrara.
- October 2015–December 2015: Calculus I, MSc in Architecture, University of Ferrara.
- September 2015–December 2015: Continuous Mechanics, MSc in Mathematics, University of Ferrara.
- October 2014–December 2014: Calculus II, BSc in Civil Engineering, University of Ferrara.
- February 2013–June 2013: Stochastic Calculus and Applications, MSc in Mathematics, University of Milan.

October 15th, 2021

A handwritten signature in black ink, appearing to read "Mattia Zanella", with a long horizontal stroke extending to the left.