

Andrea Tosin

Curriculum Vitae

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General Information

Name, Surname Andrea Tosin
Nationality Italian
Date of birth 22nd September 1980
Place of birth Turin, Italy
Gender Male

Education

Studies

PhD (2008) Mathematics for Engineering Sciences (Politecnico di Torino, Italy)
MSc (2004) Mathematical Engineering (Politecnico di Torino, Italy)
BSc (2002) Mathematics for Engineering Sciences (Politecnico di Torino, Italy)

Languages

Italian Native
English TOEFL (CBT)
French DELF A1-A4

Score: 270/300
Score: 307.70/360

Academic Positions

Current

Oct 15–present **Associate Professor** of Mathematical Physics (MAT/07)
Department of Mathematical Sciences “G. L. Lagrange”
Politecnico di Torino
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Previous

Oct 11–Oct 15 **Researcher**
Istituto per le Applicazioni del Calcolo “M. Picone”
Consiglio Nazionale delle Ricerche
Roma, Italy
Nov 08–Sept 11 **INdAM Postdoctoral Fellow**
Department of Mathematics
Politecnico di Torino, Italy
Funding Agency: Compagnia di San Paolo

Oct 07–Oct 08 **Research Fellow**
Istituto per le Applicazioni del Calcolo “M. Picone”
Consiglio Nazionale delle Ricerche (Roma, Italy)
Funding Agency: University of Salerno (Fisciano SA, Italy)

Qualifications

2017 National Scientific Qualification (ASN – “Abilitazione Scientifica Nazionale”) as full professor in Mathematical Physics
Validity 28th March 2017 through 28th March 2023
Report http://calvino.polito.it/~tosin/pdf/ASN19212_I.pdf

Prizes and Honours

2013 SIMAI 2013 prize for young scientists in Applied Mathematics
2011 INdAM-SIMAI 2010 prize for the best PhD Italian theses in Applied Mathematics

Scientific Activity

Research

Research Field **Mathematical Physics** and **Applied Mathematics**
Research Topics Traffic problems (vehicular traffic, crowd dynamics), social systems, biological systems
Methods Multiscale modelling, kinetic theory, transport and diffusion equations, numerical simulations

Projects and Grants

Dec 17 National Grant for Fundamental Research (FFABR)
Grant 3 k€

Jul 16-Jul 18 Politecnico di Torino and Compagnia di San Paolo Starting Grant “Attracting Excellent Professors”
Title Vehicular and pedestrian traffic models: from flow forecast to safety management
Role Principal Investigator
Grant 100 k€

2012 Google Research Award
Title Multi-population models for vehicular traffic and pedestrians
Role Participant

2010–2014 FP7 NoE HYCON2
Title Highly-complex and networked control systems
Role Participant (CNR Unit)

2011 INdAM-GNFM Young Researchers Project
Title Multiscale methods and models for collective behaviors in living complex systems
Role Principal Investigator
Grant 2 k€

2011–2013 PRIN
Title Nonlinear hyperbolic problems for applications
Role Participant

- 2009–2011 PRIN
 Title Mathematical models of mechanical interactions of cells and cell aggregates with the surrounding environment
 Role Participant
- 2006–2008 PRIN
 Title Mathematical models of growth and vascularisation of tumours and biological tissues
 Role Participant
- 2005 INdAM Project
 Title Traffic flows and optimization on complex networks
 Role Participant

Organisation of Conferences

- Oct 17 “Problems in discrete dynamics: from biochemical systems to rare events, networks, clustering and related topics - II Edition” – Arcidosso GR, Italy
- Jul 14 “Complex Systems (vehicular traffic, crowd dynamics, biological systems, social systems)” Mini-Symposium within the SIMAI 2014 Congress – Taormina ME, Italy
- Nov 12 “From individual to collective behaviour: crowds and swarms” – Roma, Italy
- Jun 10 “Crowd and swarm dynamics: interactions, self-organization, mathematics, applications” Young Researcher Mini-Symposium within the SIMAI 2010 Congress – Cagliari, Italy

Editorial Activity

- 2012-present Member of the Editorial Board of “SEMA SIMAI Springer Series”
- 2013-2015 Member of the Editorial Board of the Springer-Birkhäuser Series (Boston, USA) “Modeling and Simulation in Science, Engineering and Technology”

Referee Activity

- Referee for Applied Mathematical Modelling • Communications in Mathematical Sciences • Comptes Rendus – Mécanique • Discrete and Continuous Dynamical Systems – Series B • Journal of Computational and Applied Mathematics • Journal of Differential Equations • Journal of Mathematical Biology • Journal of Physics A: Mathematical and Theoretical • Journal of Theoretical Biology • Kinetic and Related Models • Mathematical Models and Methods in Applied Sciences • Networks and Heterogeneous Media • New Journal of Physics • Physica A • SIAM Journal on Control and Optimization • Transportation Research Part C: Emerging Technologies

Publons Certified referee activity: <https://publons.com/a/591032>

Students

- Sep 17 Julien Genovese
BSc Mathematics for Engineering, Politecnico di Torino, Italy
 Thesis: “Conservation laws for vehicular traffic”
- Jun 17–Aug 17 Sebastiano Roncoroni
Research fellow, Politecnico di Torino, Italy
 Research topic: Boltzmann-type kinetic equations for the study of non-homogeneous vehicular traffic
- Jan 17–present Mattia Zanella
Postdoc, Politecnico di Torino, Italy
 Research topic: Kinetic models of multi-agent systems, Fokker-Planck asymptotics and related numerical approximations
- Oct 16–present Nadia Loy
PhD student (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Research topic: Kinetic and continuous models of biological systems

- Nov 15–present Raul De Maio
PhD student (co-supervised with Fabio Camilli), “Sapienza” University of Rome, Italy
 Research topic: Multiscale models of traffic flow on networks
- Oct 15 Raul De Maio
MSc Applied Mathematics (co-supervised with Eugenio Montefusco), “Sapienza” University of Rome, Italy
 Thesis: “A multiscale approach to vehicular traffic”
- Jan 14–Dec 16 Giuseppe Visconti
PhD student (co-supervised with Gabriella Puppo and Matteo Semplice), Università degli Studi dell’Insubria, Como, Italy
 Thesis: “Single- and multi-population kinetic models for vehicular traffic reproducing fundamental diagrams and with low computational complexity”
- Jan 13–May 15 Fabio S. Priuli
Postdoc (co-supervised with Emiliano Cristiani), University of Rome “Tor Vergata” and IAC-CNR, Italy
 Research topic: Optimisation of pedestrian flows in complex environments
- Jan 12–Dec 15 Marco Scianna
Postdoc, Politecnico di Torino, Italy
 Research topic: Multiscale models of environment sensing in cell aggregates and human crowds
- Jan 12–Dec 15 Alessandro Corbetta
PhD student (co-supervised with Luca Bruno, Adrian Muntean, Federico Toschi), Politecnico di Torino, Italy & TU/e Eindhoven, the Netherlands
 Thesis: “Multiscale crowd dynamics: physical analysis, modeling and applications”
- Mar 11 Riccardo Ferrero
BSc Mathematics for Engineering Sciences (co-supervised with Enrico Serra), Politecnico di Torino, Italy
 Thesis: “Maximum principles and overdetermined elliptic problems”
- Mar 11 Lorenzo Pavese
BSc Mathematics for Engineering Sciences (co-supervised with Marco Codegone), Politecnico di Torino, Italy
 Thesis: “Elements of distributional Fourier transform with application to a linear elasticity problem”
- Dec 10 Anna Scotti
MSc Mathematical Engineering (co-supervised with Luca Bruno, Fiammetta Venuti), Politecnico di Torino, Italy
 Thesis: “The role of hanger slackening in footbridge dynamics: mathematical modelling and engineering outcomes”
- Mar 10 Annachiara Colombi
BSc Mathematics for Engineering Sciences (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: “Modelling tumour growth by mixture theory methods”
- Mar 10 Fabio Fanari
BSc Mathematics for Engineering Sciences (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: “Variational methods with applications to analytical mechanics”
- Dec 08 Miriam Pirra
MSc Mathematical Engineering (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: “Modelling pedestrian traffic by conservation laws with non-local flux”
- Dec 07 Mattia Bozzola
MSc Mathematical Engineering (co-supervised with Davide Fransos, Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: “Immersed boundary method applied to tumor cord development”

- Jul 07 Paola Latorraca
MSc Mathematical Engineering (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: "Qualitative analysis of a multiphase model for the growth of tumor cords"
- Dec 06 Miriam Pirra
BSc Mathematics for Engineering Sciences (co-supervised with Luigi Preziosi), Politecnico di Torino, Italy
 Thesis: "Tumour growth models in avascular phase"

Invited Talks

- Apr 18 Workshop "Numerical Aspects of Hyperbolic Balance Laws and Related Problems" (University of Ferrara, Italy)
- Nov 17 Meeting "The finite volumes schemes and traffic modeling" (Laboratoire de Mathématiques de Besançon, Besançon, France)
 Talk: "Control strategies for road risk mitigation in kinetic traffic modelling"
- Oct 17 Mathematics and Applications Sussex seminars (University of Sussex, Brighton, UK)
 Talk: "Kinetic and multiscale models of traffic flows"
- Sep 17 IperPV2017 – XVII Italian Meeting on Hyperbolic Equations (University of Pavia, Italy)
 Plenary talk: "Kinetic and multiscale models of traffic flows"
- May 17 Warwick EPSRC Symposium on Partial Differential Equations and their Applications – "Emerging PDE models in Socio-Economic Sciences" (Mathematics Institute, University of Warwick, UK)
 Talk: "Reducing complexity of multi-agent systems with symmetry breaking: an application to opinion dynamics with polls"
- Mar 17 CrossFields PDEs – "Current Topics in Kinetic Theory" (Institute of Mathematics of the Polish Academy of Sciences, Warsaw, Poland)
 Talk: "Kinetic description of collision avoidance in pedestrian crowds by sidestepping"
- Feb 17 Problems in discrete dynamics - From biochemical systems to rare events, networks, clustering and related topics (Arcidosso, Italy)
 Talk: "Proposal of a risk model for vehicular traffic: A Boltzmann-type kinetic approach"
- Jun 16 X Forum of Partial Differential Equations (Institute of Mathematics of the Polish Academy of Sciences, Będlewo, Poland)
 Talk: "A Boltzmann-type kinetic approach to the modelling of vehicular traffic"
- Mar 16 ANCONET "Analysis and Control on Networks: trends and perspectives" (University of Padua, Italy)
 Talk: "A Boltzmann-type kinetic approach to traffic flow on road networks"
- Nov 15 Applied PDEs Seminar (Imperial College London, UK)
 Talk: "Multiscale models of crowd dynamics"
- Oct 15 Radon Group Seminars (RICAM, Linz, Austria)
 Talk: "Multiscale models of crowd dynamics"
- Sep 15 Workshop "Mathematical Foundations of Traffic" (IPAM-UCLA, Los Angeles CA, USA)
 Talk: "A Boltzmann-type kinetic approach to the modeling of vehicular traffic"
- Jun 15 MASCOT 2015 "14th Meeting on Applied Scientific Computing and Tools" (IAC-CNR, Rome, Italy)
 Talk: "Individuality vs. Collectivity in Crowd Dynamics Modeling"
- Jan 15 Meiji Seminar on Nonlinear Mathematical Sciences (Meiji University, Tokyo, Japan)
 Talk: "Microscopic, Macroscopic: Comparison and Multiscale Coupling"
- Jan 15 ICMMA 14 Conference "Crowd Dynamics" (Meiji University, Tokyo, Japan)
 Talk: "Multiscale Modeling of Pedestrian Dynamics: Individuality vs. Collectivity"
- Oct 14 KI-Net Conference "Modeling and Control in Social Dynamics" (Rutgers University, Camden NJ, USA)
 Talk: "Generalized Kinetic Equations and Stochastic Game Theory for Social Systems"
- Jul 14 SIMAI 2014 Congress (Taormina, Italy)
 Plenary talk: "From individuals to collectivity: Multiscale methods for living complex systems"

- Jun 14 Biomat 2014 “Complexity and Emergence in Social and Biological Systems” (University of Granada, Spain)
Talk: “Traffic flow on networks: A fully-discrete kinetic theory approach”
- Sept 13 NumHyp2013 “Numerical Approximations of Hyperbolic Systems with Source Terms and Applications” (RWTH Aachen University, Germany)
Talk: “Multiscale methods for cell migration and organization – Modeling, analysis, and (some) numerics”
- Sept 13 INdAM Meeting “The Mathematics of Cells and Tissues” (Cortona, Italy)
Talk: “Multiscale modeling of *in vitro* cell organization and migration”
- May 13 INdAM Workshop “Mathematical Models and Methods for Planet Earth” (Rome, Italy)
Talk: “On the dynamics of social conflicts: looking for the Black Swan”
- Sept 10 Workshop “Partial Differential Equations in Mathematical Biology” (Institute of Mathematics of the Polish Academy of Sciences, Będlewo, Poland)
Talk: “Initial/boundary-value problems of tumor growth in mixture theory”
- Jul 09 BIRS Workshop “Multiscale Analysis of Self-Organization in Biology” (Banff, Alberta, Canada)
Talk: “Tumor growth by a mixture theory approach: modeling and analytical issues”

Visits

- Oct 17 University of Sussex
Brighton, UK
Dr. Bertram Düring
- Nov 15 Imperial College London
London, UK
Prof. José Antonio Carrillo de la Plata, Prof. Pierre Degond
- Oct 15 Johann Radon Institute for Computational and Applied Mathematics (RICAM)
Linz, Austria
Dr. Marie-Therese Wolfram
- Jul 15 University of Ferrara
Ferrara, Italy
Prof. Lorenzo Pareschi
- Dec 11 Eindhoven University of Technology (TU/e)
Eindhoven, the Netherlands
Dr. Adrian Muntean, Prof. Federico Toschi
- Nov 10 Institute of Applied Mathematics and Mechanics
Warsaw, Poland
Prof. Mirosław Lachowicz
- Apr-May 10 Rutgers University
Camden NJ, USA
Prof. Benedetto Piccoli
- Jun 07 University of Minnesota
Minneapolis MN, USA
Prof. Hans Othmer

Boards

- Jul 17 President of the PhD thesis committee of Antonella Verderosa (Politecnico di Torino, Italy)
Thesis: “Energy and density distortion in an oscillator chain” (supervisor: Lamberto Rondoni)
- Jul 17 President of the PhD thesis committee of Annachiara Colombi (Politecnico di Torino, Italy)
Thesis: “Non-local hybrid models for collective dynamics” (supervisors: Marco Scianna, Luigi Preziosi)
- Feb 16 Member of the PhD thesis committee of Alessandro Corbetta (TU/e Eindhoven, the Netherlands)
Thesis: “Multiscale crowd dynamics: physical analysis, modeling and applications” (supervisors: Luca Bruno, Federico Toschi, Adrian Muntean, Andrea Tosin)

- Dec 15 Member of the PhD thesis committee of Matthias Mimault (INRIA Sophia Antipolis - Méditerranée, France)
Thesis: "Crowd motion modeling by conservation laws" (supervisor: Paola Goatin)
- 2012-present National coordinator of the SIMAI Activity Group on Complex Systems (SisCo-SIMAI, <http://calvino.polito.it/~tosin/SisCo-SIMAI>)

Teaching

Holder of PhD Courses

- 2015 "Modeling and Simulation of Emerging Collective Behavior" ("Sapienza" University of Rome, Italy)
Series of 4 lectures on: "Macroscopic and Kinetic Models of Vehicular Traffic Flows"
- 2012 CISM Course "Analysis, Modeling and Simulation of Collective Dynamics from Bacteria to Crowds" (Udine, Italy)
Series of 8 lectures on: "Multiscale modeling of pedestrian motions by time-evolving measures"
- 2008 Intensive Program in "Mathematical Models in Life and Social Sciences" – MathMods IP 2008 (L'Aquila, Italy)
Series of 2 lectures on: "Traffic flow: modeling and networks"

Holder of BSc Courses

- 2018 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
- 2017 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
- 2016 Mathematical Methods for Engineering (Politecnico di Torino, Italy)

Teaching Assistant at BSc and MSc Courses

- 2018 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2017 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2016 Rational Mechanics (BSc, Politecnico di Torino, Italy)
- 2009 Mathematical Methods for Engineering (MSc, Politecnico di Torino, Italy)
Partial Differential Equations (BSc, Politecnico di Torino, Italy)
- 2007 Functional Analysis (MSc, Politecnico di Torino, Italy)
Partial Differential Equations (BSc, Politecnico di Torino, Italy)
- 2006 Functional Analysis (MSc, Politecnico di Torino, Italy)
Partial Differential Equations (BSc, Politecnico di Torino, Italy)
- 2005 Calculus II (BSc, Politecnico di Torino, Italy)
- 2004 Calculus II (BSc, Politecnico di Torino, Italy)

Thematic Seminar Cycles

- 2011 Complex Systems in Engineering Sciences (Politecnico di Torino, Italy)
- 2010 Mathematical Methods and Models for Complex Systems (Politecnico di Torino, Italy)

Self-Contained Mini-Courses

- 2011 Mechanics of Multiphase Systems (MSc, Politecnico di Torino, Italy)
- 2010 Mechanics of Multiphase Systems (MSc, Politecnico di Torino, Italy)
- 2008 Continuum Mechanics (MSc, Politecnico di Torino, Italy)
- 2007 Continuum Mechanics (MSc, Politecnico di Torino, Italy)
- 2006 Mechanics of multiphase systems (MSc, Politecnico di Torino, Italy)

Membership of Boards of Teachers

- 2017 Boards of Teachers of Electronics, Telecommunications and Physical Engineering (Politecnico di Torino, Italy)
Boards of Teachers of Mathematical Engineering (Politecnico di Torino, Italy)
- 2016 Boards of Teachers of Mathematical Engineering (Politecnico di Torino, Italy)

Publications

Books

- [2] E. Cristiani, B. Piccoli, A. Tosin. *Multiscale Modeling of Pedestrian Dynamics*, volume 12 of *MS&A: Modeling, Simulation and Applications*. Springer International Publishing, 2014. doi:10.1007/978-3-319-06620-2.
- [1] G. Ajmone Marsan, N. Bellomo, A. Tosin. *Complex Systems and Society – Modeling and Simulation*. SpringerBriefs in Mathematics. Springer, New York, 2013. doi:10.1007/978-1-4614-7242-1.

Papers

- [37] M. Bertsch, B. Franchi, N. Marcello, M. C. Tesi, A. Tosin. Alzheimer's disease: a mathematical model for onset and progression. *Math. Med. Biol.*, 34(2):193–214, 2017. doi:10.1093/imammb/dqw003.
- [36] M. Bertsch, B. Franchi, M. C. Tesi, A. Tosin. Microscopic and macroscopic models for the onset and progression of Alzheimer's disease. *J. Phys. A: Math. Theor.*, 50(41):414003/1–22, 2017. doi:10.1088/1751-8121/aa83bd.
- [35] F. Camilli, R. De Maio, A. Tosin. Transport of measures on networks. *Netw. Heterog. Media*, 12(2):191–215, 2017. doi:10.3934/nhm.2017008.
- [34] E. Cristiani, A. Tosin. Reducing complexity of multiagent systems with symmetry breaking: an application to opinion dynamics with polls. *Multiscale Model. Simul.*, 2017. In press (preprint: arXiv:1706.03115).
- [33] A. Festa, A. Tosin, M.-T. Wolfram. Kinetic description of collision avoidance in pedestrian crowds by sidestepping. *Kinet. Relat. Models*, 2017. In press (preprint: arXiv:1610.05056).
- [32] P. Freguglia, A. Tosin. Proposal of a risk model for vehicular traffic: A Boltzmann-type kinetic approach. *Commun. Math. Sci.*, 15(1):213–236, 2017. doi:10.4310/CMS.2017.v15.n1.a10.
- [31] G. Puppo, M. Semplice, A. Tosin, G. Visconti. Analysis of a multi-population kinetic model for traffic flow. *Commun. Math. Sci.*, 15(2):379–412, 2017. doi:10.4310/CMS.2017.v15.n2.a5.
- [30] G. Puppo, M. Semplice, A. Tosin, G. Visconti. Kinetic models for traffic flow resulting in a reduced space of microscopic velocities. *Kinet. Relat. Models*, 10(3):823–854, 2017. doi:10.3934/krm.2017033.
- [29] G. Visconti, M. Herty, G. Puppo, A. Tosin. Multivalued fundamental diagrams of traffic flow in the kinetic Fokker-Planck limit. *Multiscale Model. Simul.*, 15(3):1267–1293, 2017. doi:10.1137/16M1087035.
- [28] L. Bruno, A. Corbetta, A. Tosin. From individual behaviour to an evaluation of the collective evolution of crowds along footbridges. *J. Engrg. Math.*, 101(1):153–173, 2016. doi:10.1007/s10665-016-9852-z.
- [27] A. Colombi, M. Scianna, A. Tosin. Moving in a crowd: Human perception as a multiscale process. *J. Coupled Syst. Multiscale Dyn.*, 4(1):25–29, 2016. doi:10.1166/jcsmd.2016.1093.
- [26] A. Corbetta, A. Tosin. Comparing discrete and continuous crowd models for an increasing number of massive agents. *Adv. Math. Phys.*, 2016:6902086/1–17, 2016. doi:10.1155/2016/6902086.
- [25] G. Puppo, M. Semplice, A. Tosin, G. Visconti. Fundamental diagrams in traffic flow: the case of heterogeneous kinetic models. *Commun. Math. Sci.*, 14(3):643–669, 2016. doi:10.4310/CMS.2016.v14.n3.a3.
- [24] A. Colombi, M. Scianna, A. Tosin. Differentiated cell behavior: a multiscale approach using measure theory. *J. Math. Biol.*, 71(5):1049–1079, 2015. doi:10.1007/s00285-014-0846-z.
- [23] E. Cristiani, F. S. Priuli, A. Tosin. Modeling rationality to control self-organization of crowds: an environmental approach. *SIAM J. Appl. Math.*, 75(2):605–629, 2015. doi:10.1137/140962413.
- [22] L. Fermo, A. Tosin. A fully-discrete-state kinetic theory approach to traffic flow on road networks. *Math. Models Methods Appl. Sci.*, 25(3):423–461, 2015. doi:10.1142/S0218202515400023.

- [21] L. Fermo, A. Tosin. Fundamental diagrams for kinetic equations of traffic flow. *Discrete Contin. Dyn. Syst. Ser. S*, 7(3):449–462, 2014. doi:10.3934/dcdss.2014.7.449.
- [20] N. Bellomo, M. A. Herrero, A. Tosin. On the dynamics of social conflicts: Looking for the Black Swan. *Kinet. Relat. Models*, 6(3):459–479, 2013. doi:10.3934/krm.2013.6.459.
- [19] L. Fermo, A. Tosin. A fully-discrete-state kinetic theory approach to modeling vehicular traffic. *SIAM J. Appl. Math.*, 73(4):1533–1556, 2013. doi:10.1137/120897110.
- [18] A. Tosin. Initial/boundary-value problems of tumor growth within a host tissue. *J. Math. Biol.*, 66(1):163–202, 2013. doi:10.1007/s00285-012-0505-1.
- [17] A. Tosin. Un approccio multiscala alla dinamica delle folle mediante misure che evolvono nel tempo. *Boll. Unione Mat. Ital.*, 6(9):531–548, 2013.
- [16] N. Bellomo, B. Piccoli, A. Tosin. Modeling crowd dynamics from a complex system viewpoint. *Math. Models Methods Appl. Sci.*, 22(supp02):1230004 (29 pages), 2012. doi:10.1142/S0218202512300049.
- [15] L. Bruno, A. Tosin, P. Tricerri, F. Venuti. Non-local first-order modelling of crowd dynamics: A multidimensional framework with applications. *Appl. Math. Model.*, 35(1):426–445, 2011. doi:10.1016/j.apm.2010.07.007.
- [14] E. Cristiani, B. Piccoli, A. Tosin. Multiscale modeling of granular flows with application to crowd dynamics. *Multiscale Model. Simul.*, 9(1):155–182, 2011. doi:10.1137/100797515.
- [13] B. Piccoli, A. Tosin. Time-evolving measures and macroscopic modeling of pedestrian flow. *Arch. Ration. Mech. Anal.*, 199(3):707–738, 2011. doi:10.1007/s00205-010-0366-y.
- [12] A. Tosin, P. Frasca. Existence and approximation of probability measure solutions to models of collective behaviors. *Netw. Heterog. Media*, 6(3):561–596, 2011. doi:10.3934/nhm.2011.6.561.
- [11] A. Tosin, L. Preziosi. Multiphase modeling of tumor growth with matrix remodeling and fibrosis. *Math. Comput. Modelling*, 52(7–8):969–976, 2010. doi:10.1016/j.mcm.2010.01.015.
- [10] J. Galle, L. Preziosi, A. Tosin. Contact inhibition of growth described using a multiphase model and an individual cell-based model. *Appl. Math. Lett.*, 22(10):1483–1490, 2009. doi:10.1016/j.aml.2008.06.051.
- [9] B. Piccoli, A. Tosin. Pedestrian flows in bounded domains with obstacles. *Contin. Mech. Thermodyn.*, 21(2):85–107, 2009. doi:10.1007/s00161-009-0100-x.
- [8] L. Preziosi, A. Tosin. Multiphase and multiscale trends in cancer modelling. *Math. Model. Nat. Phenom.*, 4(3):1–11, 2009. doi:10.1051/mmnp/20094301.
- [7] L. Preziosi, A. Tosin. Multiphase modelling of tumour growth and extracellular matrix interaction: mathematical tools and applications. *J. Math. Biol.*, 58(4–5):625–656, 2009. doi:10.1007/s00285-008-0218-7.
- [6] A. Tosin. From generalized kinetic theory to discrete velocity modeling of vehicular traffic. A stochastic game approach. *Appl. Math. Lett.*, 22(7):1122–1125, 2009. doi:10.1016/j.aml.2008.11.006.
- [5] A. Tosin. Teoria cinetica discreta e teoria dei giochi stocastica per il traffico veicolare: modellistica e problemi matematici. *Boll. Unione Mat. Ital. Sez. A Mat. Soc. Cult. (8)*, 2(2):299–302, 2009.
- [4] A. Tosin. Multiphase modeling and qualitative analysis of the growth of tumor cords. *Netw. Heterog. Media*, 3(1):43–83, 2008. doi:10.3934/nhm.2008.3.43.
- [3] S. Astanin, A. Tosin. Mathematical model of tumour cord growth along the source of nutrient. *Math. Model. Nat. Phenom.*, 2(3):153–177, 2007. doi:10.1051/mmnp:2007007.
- [2] M. Delitala, A. Tosin. Mathematical modeling of vehicular traffic: a discrete kinetic theory approach. *Math. Models Methods Appl. Sci.*, 17(6):901–932, 2007. doi:10.1142/S0218202507002157.
- [1] A. Tosin, D. Ambrosi, L. Preziosi. Mechanics and chemotaxis in the morphogenesis of vascular networks. *Bull. Math. Biol.*, 68(7):1819–1836, 2006. doi:10.1007/S11538-006-9071-2.

Book Chapters

- [5] G. Ajmone Marsan, N. Bellomo, M. A. Herrero, A. Tosin. From five key questions to a System Sociology theory. In J. Bissell, C. C. S. Caiado, S. Curtis, M. Goldstein, B. Straughan, editors, *Tip-ping Points: Modelling Social Problems and Health*, chapter 7, pages 113–129. Wiley-Interscience, 2015. doi:10.1002/9781118992005.ch7.
- [4] A. Tosin. Kinetic equations and stochastic game theory for social systems. In A. Celletti, U. Locatelli, T. Ruggeri, E. Strickland, editors, *Mathematical Models and Methods for Planet Earth*, volume 6 of *Springer INdAM Series*, pages 37–57. Springer International Publishing, 2014. doi:10.1007/978-3-319-02657-2_4.

- [3] A. Tosin. Multiscale crowd dynamics: Modeling and theory. In A. Muntean, F. Toschi, editors, *Collective Dynamics from Bacteria to Crowds*, volume 553 of *CISM International Centre for Mechanical Sciences*, pages 157–177. Springer, Vienna, 2014. doi:10.1007/978-3-7091-1785-9_6.
- [2] E. Cristiani, B. Piccoli, A. Tosin. Modeling self-organization in pedestrians and animal groups from macroscopic and microscopic viewpoints. In G. Naldi, L. Pareschi, G. Toscani, editors, *Mathematical Modeling of Collective Behavior in Socio-Economic and Life Sciences*, Modeling and Simulation in Science, Engineering and Technology, pages 337–364. Birkhäuser, Boston, 2010. doi:10.1007/978-0-8176-4946-3_13.
- [1] B. Piccoli, A. Tosin. Vehicular traffic: A review of continuum mathematical models. In R. A. Meyers, editor, *Encyclopedia of Complexity and Systems Science*, volume 22, pages 9727–9749. Springer, New York, 2009. doi:10.1007/978-0-387-30440-3_576.

Conference Proceedings

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Submitted

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