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Current Position

Feb, 2018 - present

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Current Research Interests

- Cardiovascular fluid dynamics: multiscale modeling and CFD analysis
- Spatio-temporal analysis of turbulent and transitional flows

Publications

Journal Papers

[J1] A. Saglietto, S. Scarsoglio, F. Tripoli, J. J. M. Zwanenburg, G. J. Biessels, G. M. De Ferrari, L. Ridolfi, and M. Anselmino, "Atrial fibrillation hemodynamic effects on lenticulostriate arteries identified at 7-tesla cerebral MRI," *accepted for publication in Clinical and Translational Medicine*, 2023.

[J2] S. Scarsoglio, M. Fois, and L. Ridolfi, "Increased hemodynamic pulsatility in the cerebral microcirculation during parabolic flight-induced microgravity: A computational investigation," *Acta Astronautica*, vol. 211, p. 344–352, 2023. doi: 10.1016/j.actaastro.2023.06.018.

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the origin of time irreversibility in wall turbulence," *Communications Physics*, vol. 6(1), p. 91, 2023. doi: 10.1038/s42005-023-01215-y.

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microcirculatory perfusion during atrial fibrillation: a near-infrared spectroscopy study," *EP Europace*, vol. 23(8), p. 1219–1226, 2021. doi: 10.1093/europace/euab070.

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Book Chapters

[B1] F. Jeltsch, L. Turnbull, S. Scarsoglio, C. L. Alados, F. Gallart, E. N. Mueller, N. Barbier, J. D. A. Millington, J. Wainwright, M. Wieczorek, and V. Grimm, "Chapter 3: Resilience, Self-Organization, Complexity and Pattern Formation," in *Patterns of Land Degradation in Drylands: Understanding Self-Organized Ecogeomorphic Systems* (E. N. Mueller, J. Wainwright, A. J. Parsons, L. Turnbull, ed.), pp. 55–84, ISBN: 978–94–007–5726–4, Springer, 2014. doi: 10.1007/978-94-007-5727-1_3.

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Proceedings and Conference Presentations (Speaker underlined)

[PC1] Fois, M., A. Diaz-Artiles, S. Y. Zaman, L. Ridolfi, and S. Scarsoglio, "An in silico-in vivo framework for the acute ocular and cardiovascular response to 6° head-down tilt," in *XII Italian Chapter of the European Society of Biomechanics*, vol. 12, (XII Annual Meeting of the Italian Chapter of the European Society of Biomechanics, Torino, Italy, September 18-19, 2023), p. 1, 2023.

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[PC24] Gallo, C., S. Scarsoglio, and L. Ridolfi, "Multiscale model of the cardiovascular system: application to pathological and altered acceleration conditions," in *European Fluid Mechanics Conference 12 Book of Abstracts*, vol. 12, (12th European Fluid Mechanics Conference, Wien, Austria, September 9-13, 2018), pp. 143–143, ISBN: 978–3–200–05859–0, 2018.

[PC25] Iacobello, G., S. Scarsoglio, J. G. M. Kuerten, and L. Ridolfi, "Spatial investigation of wall turbulence via complex networks," in *European Fluid Mechanics Conference 12 Book of Abstracts*, vol. 12, (12th European Fluid Mechanics Conference, Wien, Austria, September 9-13, 2018), pp. 731–731, ISBN: 978–3–200–05859–0, 2018.

[PC26] Scarsoglio, S., A. Saglietto, M. Anselmino, and L. Ridolfi, "Cerebral blood flow: possible hemodynamic links between atrial fibrillation and cognitive decline," in *European Fluid Mechanics Conference 12 Book of Abstracts*, vol. 12, (12th European Fluid Mechanics Conference, Wien, Austria, September 9-13, 2018), pp. 145–145, ISBN: 978–3–200–05859–0, 2018.

[PC27] Gallo, C., L. Ridolfi, and S. Scarsoglio, "A multi-scale mathematical model of the cardiovascular system for investigation of cardiac arrhythmias," in *Book of abstracts of SIMAI 2018*, vol. 14, (SIMAI Conference, Rome, Italy, July 2-6, 2018), pp. 150–151, ISBN: 978–88–6493–045–9, 2018.

[PC28] Iacobello, G., S. Scarsoglio, J. G. M. Kuerten, and L. Ridolfi, "Spatial network investigation of wall turbulence," in *6th International Conference on Complex Networks and Their Applications Book of Abstracts*, vol. 6, (6th International Conference on Complex Networks and Their Applications, Lyon, France, November 29 - December 1, 2017), pp. 300–302, ISBN: 978–2–9557050–2–5, 2017.

[PC29] Calò, K., M. Owais Khan, D. Gallo, S. Scarsoglio, D. A. Steinman, L. Ridolfi, and U. Morbiducci, "Exploring intracranial aneurysm hemodynamics with a complex networks approach," in *Proceedings of the VII Meeting of the Italian Chapter of the European Society of Biomechanics*,

vol. 7, (VII Annual Meeting Italian Chapter of the European Society of Biomechanics, Rome, Italy, September 28-29, 2017), pp. 17–18, ISBN: 978–88–6296–000–7, 2017.

[PC30] Iacobello, G., S. Scarsoglio, and L. Ridolfi, "Characterization of turbulent channel flows: from time-series to complex networks," in *16th European Turbulence Conference Book of Abstracts*, vol. 16, (16th European Turbulence Conference, Stockholm, Sweden, August 21-24, 2017), p. 28776, 2017.

[PC31] Gallo, C., S. Scarsoglio, and L. Ridolfi, "Pressure alterations along the arterial tree during atrial fibrillation," in *23rd Congress of the European Society of Biomechanics Book of Abstracts*, vol. 23, (23rd Congress of the European Society of Biomechanics, Seville, Spain, July 2-5, 2017), p. 1137, 2017.

[PC32] Anselmino, M., A. Saglietto, S. Scarsoglio, L. Ridolfi, and F. Gaita, "Cerebral hypoperfusions and hypertensive events during atrial fibrillation: a mechanism for cognitive impairment?," in *European Heart Journal, ESC Congress 2016, Oxford University Press*, vol. 37, Issue suppl. 1, (European Society of Cardiology Congress, Rome, Italy, 27-31 August, 2016), pp. 608–609, 2016. doi: 10.1093/eurheartj/ehw433.

[PC33] Iacobello, G., S. Scarsoglio, and L. Ridolfi, "New insights into spatial characterization of turbulent flows: a complex network-based analysis," in *8th European Postgraduate Fluid Dynamics Conference Book of Abstracts*, vol. 8, (8th European Postgraduate Fluid Dynamics Conference, Warsaw, Poland, July 6-9, 2016), p. 38, 2016.

[PC34] Anselmino, M., A. Saglietto, S. Scarsoglio, L. Ridolfi, and F. Gaita, "Hemodynamic impact of valve diseases during persistent atrial fibrillation: a computational approach," in *13 Congresso Nazionale AIAC*, vol. 13, (13 Congresso Nazionale AIAC, Bologna, Italy, 10-12 March, 2016), p. 1, 2016.

[PC35] Saglietto, A., M. Anselmino, S. Scarsoglio, C. Camporeale, F. Gaita, and L. Ridolfi, "New insights into rate control therapy of atrial fibrillation: a lumped-model approach," in *76 Congresso Annuale Società Italiana Cardiologia*, vol. 76, (76 Congresso Annuale Società Italiana Cardiologia, Rome, Italy, 11-14 December, 2015), p. 1, 2015.

[PC36] Saglietto, A., M. Anselmino, S. Scarsoglio, F. Gaita, and L. Ridolfi, "Higher resting heart rate relates to greater rise in pulmonary vein pressure under exercise during permanent atrial fibrillation: a computational study," in *76 Congresso Annuale Società Italiana Cardiologia*, vol. 76, (76 Congresso Annuale Società Italiana Cardiologia, Rome, Italy, 11-14 December, 2015), p. 1, 2015.

[PC37] Scarsoglio, S., A. Guala, C. Camporeale, and L. Ridolfi, "Characterizing the cardiovascular functions during atrial fibrillation through lumped-parameter modeling," in *Alma Mater Studiorum Acta, Proceedings of ICMMB 2014, Editors: R. Zannoli, I. Corazza, R. Stagni*, vol. 19, (19 International Conference on Mechanics in Medicine and Biology, Bologna, Italy, 3-5 September, 2014), pp. 347–351, ISBN: 978–88–901675–1–5, 2014. doi: 10.6092/unibo/amsacta/4085.

[PC38] De Santi, F., S. Scarsoglio, W. O. Criminale, and D. Tordella, "Role of the obliquity angle on the perturbed cross-flow boundary layer," in *XXI AIMETA Conference Book*, vol. 21, (XXI AIMETA Conference, 17-20 September 2013, Torino, Italy), p. 33, 2013.

[PC39] De Santi, F., S. Scarsoglio, W. O. Criminale, and D. Tordella, "Perturbed cross-flow boundary layer: nontrivial effects of the obliquity angle at small and high Reynolds numbers," in *European Turbulence Conference 14 Book of Abstracts*, vol. 14, (14th Euromech European Turbulence Conference, Lyon, France, September 1-4, 2013), p. 2, 2013.

[PC40] Scarsoglio, S., F. De Santi, and D. Tordella, "Travelling perturbations in sheared flows: sudden transition in frequency and phase speed asymptotics," in *European Fluid Mechanics Conference 9 Book of Abstracts*, vol. 9, (European Fluid Mechanics Conference 9, Rome, Italy, September 9-13, 2012), p. 1, 2012.

[PC41] De Santi, F., S. Scarsoglio, and D. Tordella, "On the frequency of hydrodynamic perturbations. Early and intermediate transients," in *6th European Postgraduate Fluid Dynamics Conference*

Book of Abstracts, vol. 6, (6th European Postgraduate Fluid Dynamics Conference, London, UK, July 10-12, 2012), p. 60, 2012.

[PC42] S. Scarsoglio, De Santi, F., and D. Tordella, "Collective behaviour of linear perturbation waves observed through the energy density spectrum," in *Journal of Physics: Conference Series*, vol. 318, (13th Euromech European Turbulence Conference, Warsaw, Poland, September 12-15, 2011), pp. 032004/1–6, ISSN: 1742–6588, 2011. doi: 10.1088/1742-6596/318/3/032004.

[PC43] Scarsoglio, S., F. De Santi, and D. Tordella, "Does the Kolmogorov scaling bridge hydrodynamic linear stability and turbulence?," in *Bull. Am. Phys. Soc.*, vol. 56, (64th Annual Meeting Division of Fluid Dynamics (APS-DFD), Baltimore MD, USA, November 20-22, 2011), p. 40, 2011.

[PC44] Scarsoglio, S., F. De Santi, M. Mastinu, G. Barletta, K. Weaver, and D. Tordella, "Energy spectrum power-law decay of linearized perturbed shear flows," in *5th European Postgraduate Fluid Dynamics Conference Book of Abstracts*, vol. 5, (5th European Postgraduate Fluid Dynamics Conference, Göttingen, Germany, August 9-12, 2011), p. 9, 2011.

[PC45] Scarsoglio, S., F. De Santi, and D. Tordella, "Power-law decay of the energy spectrum in linearized perturbed systems," in *Fourth International Symposium "Bifurcations and Instabilities in Fluid Dynamics"*, vol. 4, (4th International Symposium "Bifurcations and Instabilities in Fluid Dynamics", Barcelona, Spain, July 18-21, 2011), p. 1, 2011.

[PC46] Allamano, P., E. Bartolini, P. Claps, F. Laio, and S. Scarsoglio, "Spatial interpolation of extreme-precipitation with intermittent records," in *Geophysical Research Abstracts EGU2011*, vol. 13, (European Geosciences Union, General Assembly 2011, Vienna, Austria, April 3-8, 2011), p. 12207, 2011.

[PC47] S. Scarsoglio and Tordella, D., "Pre-unstable set of multiple transient 3D perturbation waves and the associated turbulent state in a shear flow," in *Proceedings of the 17th Australasian Fluid Mechanics Conference*, vol. 17, (17th Australasian Fluid Mechanics Conference, Auckland, New Zealand, December 5-9, 2010), pp. 360–363, ISBN: 978–0–86869–129–9, 2010.

[PC48] Scarsoglio, S. and D. Tordella, "Energy spectrum in shear flows. a general pre-unstable large set of multiple transient 3D waves and the turbulent state," in *European Fluid Mechanics Conference 8 Book of Abstracts*, vol. 8, (European Fluid Mechanics Conference 8, Bad Reichenhall, Germany, September 13-16, 2010), pp. S3–31, 2010.

[PC49] Scarsoglio, S., D. Tordella, and W. O. Criminale, "Linear generation of multiple time scales by 3D unstable perturbations," in *Springer Proceedings in Physics Advances in Turbulence XII, Bruno Eckhardt Editor, Springer (DEU)*, vol. 132, (12th Euromech European Turbulence Conference, Marburg, Germany, September 7-10, 2009), pp. 155–158, ISBN: 978–3–642–030, 2009. doi: 10.1007/978–3-642–03085–7.

[PC50] S. Scarsoglio, Tordella, D., and W. O. Criminale, "Multiscale analysis of long 3D perturbation waves in shear flows," in *European Fluid Mechanics Conference 7 Book of Abstracts*, vol. 7, (European Fluid Mechanics Conference 7, Manchester, England, September 14-18, 2008), p. 338, 2008.

[PC51] Scarsoglio, S., D. Tordella, and W. O. Criminale, "A multiscale approach to study the stability of long waves in near-parallel flows," in *Bull. Am. Phys. Soc.*, vol. 52, (60th Annual Meeting Division of Fluid Dynamics (APS-DFD), Salt Lake City UT, USA, November 18-20, 2007), p. 64, 2007.

[PC52] Scarsoglio, S., D. Tordella, and W. O. Criminale, "Temporal dynamics of small perturbations for a 2D growing wake," in *Advances in Turbulence XI. ETC11, CIMNE (ESP)*, vol. 117, (11th Euromech European Turbulence Conference, Porto, Portugal, June 25-29, 2007), pp. 221–223, ISBN: 978–3–540–72603–6, 2007. doi: 10.1007/978-3-540-72604-3_70.

[PC53] Scarsoglio, S., D. Tordella, and W. O. Criminale, "Initial-value problem for the 2D growing wake," in *Bull. Am. Phys. Soc.*, vol. 51, (59th Annual Meeting Division of Fluid Dynamics (APS-DFD), Tampa FL, USA, November 19-21, 2006), p. 88, 2006.

[PC54] Tordella, D., S. Scarsoglio, and M. Belan, "A synthetic perturbative hypothesis for multiscale analysis of bluff-body wake instability," in *European Fluid Mechanics Conference 6 Book of Abstracts*, vol. 6, (Euromech Fluid Mechanics Conference 6, Stockholm, Sweden, June 26-30, 2006), p. 317, 2006.

[PC55] Scarsoglio, S., D. Tordella, and M. Belan, "Analysis of the convective instability of the 2D wake," in *22nd IFIP TC 7 Conference on System Modeling and Optimization*, vol. 1, (22nd IFIP TC 7 Conference on System Modeling and Optimization, Torino, Italy, July 18-22, 2005), p. 77 (5 pages), 2005.

PhD Thesis

[T1] S. Scarsoglio, *Hydrodynamic linear stability of the two-dimensional bluff-body wake through modal analysis and initial-value problem formulation*. PhD thesis, Politecnico di Torino, Torino, Italy, 2008.

Invited Talks

May 23, 2023 *Human spaceflight alterations: a journey from experiments to computational modeling*, Missione Spazio: come orbitano corpo e mente, Politecnico di Torino, Torino, Italy (hosted by AESA Torino).

Jun 24-25, 2020 *Complex Networks Approach to Wall-Bounded Turbulence*, Workshop on Network Science for Fluid Dynamics, online at UCLA, Los Angeles, California USA (hosted by Prof. K. Taira and Dr. M. Munson).

Feb 18, 2015 *Lumped-parameter modeling of the cardiovascular system*, "Città della Salute e della Scienza" Hospital, University of Turin, Division of Cardiology, Torino, Italy (hosted by Dr. M. Anselmino and Prof. F. Gaita).

Jun 22, 2011 *Spatial pattern formation induced by stochastic processes*, Systems Biomedicine, Department of Experimental Oncology, Campus IFOM-IEO, Milan, Italy (hosted by Dr. A. D'Onofrio).

Apr 6, 2011 *Hydrodynamic stability and energy spectrum power-law decay of linearized perturbed systems: the 2D bluff-body wake*, Computational Science and Engineering Laboratory, ETH Zurich, Zurich, Switzerland (hosted by Prof. P. Koumoutsakos).

Jun 7-10, 2010 *Noise-induced spatial pattern formation*, European Science Foundation Workshop "Self-organised ecogeomorphic systems: confronting models with data for land-degradation in drylands". Poster presentation and seminar session. Potsdam, Germany.

May 6, 2010 *Hydrodynamic linear stability of the two-dimensional bluff-body wake through modal analysis and initial-value problem formulation* and *Noise-induced spatial pattern formation in dynamical systems*, DICAT, Università degli Studi di Genova, Genova, Italy (hosted by Prof. A. Bottaro).

Sep 4, 2007 *Instability and turbulence in flows of automotive and aeronautical interest*, Research Projects between Unione Industriale Torino and Politecnico di Torino. Unione Industriale Torino, Torino, Italy.

Apr 6, 2006 *Absolute and convective instability of the two-dimensional wake*, Applied and Computational Mathematical Sciences Seminars, University of Washington, Seattle, Washington USA (hosted by Dr. C. Lind and Prof. W. O. Criminale).

Qualifications

2023 National Scientific Qualification (ASN – "Abilitazione Scientifica Nazionale") as full professor in Aeronautical, Aerospace and Marine Engineering, 09/A1

Validity: 6th February 2023 through 6th February 2033

Institutional Academic Roles

2020 Member of the Scientific Board for PhD Admission Examination (Politecnico di Torino, 36 Cycle, Aerospace Engineering)

2017-present Member of the PolitoBIOMed Lab - Biomedical Engineering Lab, Politecnico di Torino

2017-present Student Tutoring Service for the MSc and BSc Degrees in Aerospace Engineering, Politecnico di Torino

2017-present Reference Teacher within the AVA-ANVUR Procedure (Italian National Agency for the Evaluation of the University and Research Systems) for the BSc Degree in Aerospace Engineering, Politecnico di Torino

2017-present Member of the Scientific Boards for Assistant Professor positions (Researcher A-Type) in Fluid Dynamics (University of Bologna, University of Naples, Politecnico di Torino)

2017-present Member of the Scientific Board for PhD Final Examination (Politecnico di Torino and Università degli Studi di Udine)

2020 Member of the Scientific Board for PhD Admission Examination (Politecnico di Torino)

2015-2016 Aggregate member (Aerospace Engineering) of the Committee for the Professional Engineering Qualifying Examination (Esami di stato per l'abilitazione all'esercizio della professione di Ingegnere), I and II sessions, Politecnico di Torino

2015-present Erasmus+ and Extra-UE Mobility Coordinator for the MSc Degree in Aerospace Engineering, Politecnico di Torino

2016-present "Young Talent Project" Mobility Coordinator for the BSc Degree in Aerospace Engineering, Politecnico di Torino

2015-present Member of the Scientific Board for Post-graduate and Post-doc research fellowships, Politecnico di Torino

2015-present Effective Member of the Scientific Board for the PhD School in Aerospace Engineering, Politecnico di Torino

2014 Aggregate Member of the Scientific Board for the PhD School in Aerospace Engineering, Politecnico di Torino

2013-2014 Aggregate Member of the Scientific Board for the PhD School in Environmental Engineering, Politecnico di Torino

2012-present Member of the Degree Board for Aerospace Engineering (MSc and BSc), Mechanical Engineering (MSc and BSc), Civil Engineering (MSc), Biomedical Engineering (MSc), Politecnico di Torino

2012-present Member of the Examination Board for Aerospace Engineering Courses (Aeroelasticity, Applied Aerodynamics, Aerodynamics, Aero-acoustics, Applied thermodynamics and heat transfer), and Mathematical Engineering Courses (Fluid Dynamics), Politecnico di Torino

Previous Positions

Oct, 2014 - Jan, 2018 **Assistant Professor with tenure in Fluid Dynamics**
Department of Mechanical and Aerospace Engineering
Politecnico di Torino, Torino, Italy

Oct, 2011 - Oct, 2014 **Assistant Professor in Fluid Dynamics**
Department of Mechanical and Aerospace Engineering
Politecnico di Torino, Torino, Italy

Jul, 2011 - Sep, 2011 **Term-Contract Worker**
CIFS, Interuniversity Consortium for Space Physics, Torino, Italy
Scientific Advisor: Prof. D. Tordella.

Jul, 2009 - May, 2011 **Post-Doctoral Research Fellow**
Department of Water Engineering, Politecnico di Torino, Torino, Italy
Project: Spatial pattern formation induced by stochastic processes.
Scientific Advisors: Prof. F. Laio and Prof. L. Ridolfi.

May, 2008 - May, 2009 **Fluid Dynamics and Mechanical Analyst**
Fiat Research Center, Powertrain Technologies and Research, Torino, Italy
Finite element modelling, thermal and thermo-structural analysis. Engine components analysis for automotive Diesel and gasoline applications

Feb-May, 2008 **Post-Doctoral Research Fellow**
Department of Aeronautics and Space Engineering, Politecnico di Torino
Project: Regione Piemonte Research Grant E59 "Aerodynamic simulation of an ultra-light airfoil".
Scientific Advisor: Prof. D. Tordella.

Visiting Positions

Oct, 2011 - Dec, 2011 **Visiting assistant professor**
Massachusetts Institute of Technology, Cambridge MA, USA
Mathematics Department, Prof. G. Staffilani

Jan, 2006 - Jan, 2007 **Visiting graduate student**
University of Washington, Seattle WA, USA
Department of Applied Mathematics, Prof. W. O. Criminale

Organization of scientific meetings

Oct, 2009 **Member of the Organizing Committee**
Euromech Colloquium 512, *Small Scale Turbulence and Related Gradient Statistics* (www.euromech512.polito.it/), Accademia delle Scienze di Torino, Torino, Italy.

Referee Activity

Referee for the following ISI journals:

- Scientific Reports, Journal of Fluid Mechanics, Annals of Biomedical Engineering, PLoS ONE, Computer Methods and Programs in Biomedicine, Journal of Computational Physics, Chaos, Physics Letters A, Fluid Dynamics Research, Journal of Fluids Engineering, International Journal of Bifurcation and Chaos, Frontiers in Human Neuroscience, Hydrology and Earth System Sciences, Ecological Complexity, Stochastic Environmental Research and Risk Assessment, Discrete Dynamics in Nature and Society

Memberships of Scientific Societies

2006-present Member of the European Mechanics Society

2006-present Member of the American Physical Society

Teaching Experience

Teacher

2023-present Teacher, *Biofluid dynamics and space medicine* (Master Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2022-present Teacher, *Thermo-fluid dynamics* (Undergraduate Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2018-2023 Teacher (together with Dr. D. D'Ambrosio), *Fluid dynamics in space flight* (Master Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2016-2022 Teacher, *Applied thermodynamics and heat transfer* (Undergraduate Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2015-2016 Teacher (together with Prof. E. Carrera), *Aeroelasticity* (Master Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2007-2008 Teacher (together with Prof. D. Tordella and Dr. G. Khujadze), *Hydrodynamic Stability* (PhD course, Politecnico di Torino, Torino, Italy)

Teaching Assistant

2012-2023 *Aerodynamics* (teacher: Prof. R. Arina, Undergraduate Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2014-2015 *Gas dynamics* (teacher: Prof. G. Iuso, Master Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2012-2015 *Applied aerodynamics* (teacher: Prof. G. M. Di Cicca, Undergraduate Course, Aerospace Engineering, Politecnico di Torino, Torino, Italy)

2011-2014
2007-2008 *Fluid dynamics* (teacher: Prof. D. Tordella, Master Course, Mathematical Engineering, Politecnico di Torino, Torino, Italy)

Thesis and Research Project Advisership

PhD Students

Nov, 2020 - present — Matteo Fois
Research Topic: "Multiscale mathematical modeling of human cardiovascular system with emphasis on gravity influence for spaceflight applications".
PhD School in Aerospace Engineering, Politecnico di Torino, XXXVI Cycle

May, 2020 - present — Davide Perrone
Research Topic: "Network-based approach to transition and turbulence".
PhD School in Aerospace Engineering, Politecnico di Torino, XXXVI Cycle

Nov, 2017 - Jan, 2021 — Caterina Gallo
Research Topic: "A multiscale modelling of the cardiovascular fluid dynamics for clinical and space applications".
PhD School in Aerospace Engineering, Politecnico di Torino, XXXIII Cycle (Advisor: S. Scarsoglio, Co-Advisor: L. Ridolfi)

Nov, 2016 - Apr, 2020 — Giovanni Iacobello
Research Topic: "Spatio-temporal analysis of wall-bounded turbulence: A multidisciplinary perspective via complex networks".
PhD School in Aerospace Engineering, Politecnico di Torino, XXXII Cycle (Advisor: S. Scarsoglio)

Master Degree

ongoing — M. Mastrogiacomo, *Fluid dynamics of cardiac valves*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: Auburn University/Polito, Advisors: S. Scarsoglio, V. Raghav)

Jul, 2023 — G. Santanatoglia, *A fluid dynamics study using image processing of scallops on dissolving hard candy*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: University of Twente/Polito, Advisors: S. Scarsoglio, S. Huisman)

Apr, 2023 — N. Francescato, *Self-excited oscillations in collapsible tubes*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: Auburn University/Polito, Advisors: S. Scarsoglio, V. Raghav)

Jul, 2022 — F. Tripoli, *Computational hemodynamics of lenticulostriate arteries during atrial fibrillation*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Mar, 2022 — C. Viazzo, *Analysis of historical temperature time-series*, MSc in Mathematical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi and P. Salizzoni)

Mar, 2022 — M. Perrone, *Innovative analysis of turbulent transport*, MSc in Mathematical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi and G. Iacobello)

Dec, 2021 F. Montanari, *Methods for planning the logistical operations of a vehicle fleet to support a production line*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: Institut Superieur de Mecanique de Paris/Polito, Advisors: R. Arina, S. Scarsoglio, P. Leclaire, A. Bit-Monnot)

Dec, 2021 M.C. Arminio, *CFD analysis of lenticulostriate arteries in presence of cardiac arrhythmias*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi and G. Dubini)

Dec, 2019 D. Perrone, *Lagrangian analysis of the turbulent mixing*, MSc in Aerospace Engineering, Politecnico di Torino (Advisor with L. Ridolfi)

Jul, 2019 L. Capello, *Recurrence plot analysis of turbulent boundary layers with passive scalar dispersion*, MSc in Mechanical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi and G. Iacobello)

Mar, 2019 M. Grumo, *Complex network analysis of wind tunnel experiments on the passive scalar dispersion in a turbulent boundary layer*, MSc in Aerospace Engineering, Politecnico di Torino (Advisor with L. Ridolfi and G. Iacobello)

Dec, 2018 A. Pasino, *Innovative analyses of meteorological data*, MSc in Mathematical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi and G. Iacobello)

Dec, 2018 F. Dallari, *Complex-network analysis of turbulent channel flow: effects of the Reynolds number*, MSc in Aerospace Engineering, Politecnico di Torino (Advisor with L. Ridolfi and G. Iacobello)

Oct, 2018 I. Ferrandino, *Heartbeat sequence extraction from cerebral NIRS measures*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Oct, 2018 M. Assale, *Network analysis of MRI-based aortic blood flow*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Oct, 2017 M. Bivona, *Validation of a 3D thermo-hydraulic code for the steam generation*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: École Centrale de Lyon/Polito, Advisors: S. Scarsoglio, and J.M. Vignon)

Oct, 2017 M. Nicoletti, *Implementation of a wake detector and wind farm control algorithm for wind tunnel tests*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: Technical University of Munich/Polito, Advisors: S. Scarsoglio, R. Arina, and J. Schreiber)

Jul, 2017 A. Cina, *Predictive models for the evolution of aortic aneurysms. Formulation and validation on the Database of the Hypertension Center "Città della Salute e della Scienza di Torino" Hospital*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Apr, 2017 C. Gallo, *Effects of arrhythmias on the arterial fluid dynamics*, MSc in Aerospace Engineering, Politecnico di Torino (Advisor with L. Ridolfi)

Mar, 2017 F. Antigo, *Determinants of the evolution of aortic aneurysms. Multivariate analysis of the Database of the Hypertension Center "Città della Salute e della Scienza di Torino" Hospital*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Dec, 2016 T. Rossi, *Numerical analysis of surface pattern for a clutch*, MSc in Mechanical Engineering, Politecnico di Torino (Thesis abroad: Karlsruhe Institute of Technology/Polito, Advisors: S. Scarsoglio, B. Frohnapfel, J. Kriegseis, and A. Codrignani)

Dec, 2016 R. Giunta, *Hydraulic losses in Fontan procedure for the treatment of the univentricular heart in infants. A numerical study*, MSc in Biomedical Engineering, Politecnico di Torino (Advisor with D. Gallo, L. Ridolfi, and U. Morbiducci)

Oct, 2016 F. Cazzato, *From time-series to complex networks: application to the cerebrovascular patterns in atrial fibrillation*, MSc in Biomedical Engineering, Politecnico di Torino (Co-advisor with L. Ridolfi)

Oct, 2016 F. Imerti, *Lattice-Boltzmann numerical simulation of a rod in the sub-critical turbulent regime*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: École Centrale de Lyon/Polito, Advisors: S. Scarsoglio, R. Arina, and E. Lévêque)

Jul, 2016 A. Aprile, *Modeling and simulation of irregular sea spectra*, MSc in Aerospace Engineering, Politecnico di Torino (Thesis abroad: NASA JPL CalTech/Polito, Advisors: R. Arina, S. Scarsoglio and M. B. Quadrelli)

Apr, 2016 G. Iacobello, *New insights into spatial characterization of turbulent flows: a complex network-based analysis*, MSc in Aerospace Engineering, Politecnico di Torino

Dec, 2015 E. Siuni, *Elastodynamics of collapsible tubes*, MSc in Civil Engineering, Politecnico di Torino (Co-advisor with C. Camporeale and L. Ridolfi)

Jul, 2014 G. Barletta, *A complex network approach for the analysis of turbulent flows. Application to homogeneous isotropic turbulence*, MSc in Aerospace Engineering, Politecnico di Torino

Dec, 2012 A. Boscolo, *Perturbative and mean pressure field in the 3D boundary layer*, MSc in Aerospace Engineering, Politecnico di Torino (Co-advisor with D. Tordella)

Jul, 2011 M. Mastinu, *Collective behaviour of 3D linear perturbation waves in shear flows*, MSc in Mathematical Engineering, Politecnico di Torino (Co-advisor with D. Tordella)

Bachelor Degree

2010-present Advisor of more than 50 Bachelor Final Projects for the BSc in Aerospace and Mechanical Engineering, Politecnico di Torino

National and International Research Projects and Grants

2023-present **MUR PRIN 2022**

Title: "Cerebral fluid dynamics: investigating the association between atrial fibrillation and dementia through an integrated in silico-in vivo framework".

Role: Principal Investigator

2023-present **ESA PhD co-funded Research Project Open Space Innovation Platform (OSIP)**

Title: "Optimizing countermeasures against cardiovascular deconditioning and cerebral hemodynamics changes in long-term human spaceflights".

Role: Principal Investigator

2023 **Post-Graduate Research Fellowship**

Research Topic: "Gravity effects on the cardiovascular system: multiscale hemodynamic analysis in micro- and hypergravity conditions for human spaceflight". Fellowship awarded to Francesco Tripoli.

Role: Supervisor (with L. Ridolfi)

2022-2023 **Post-Graduate Research Fellowship**

Research Topic: "Cerebral hemodynamics during cardiac arrhythmias: CFD analysis of lenticulostriate arteries through high-resolution magnetic resonance imaging". Fellowship awarded to Francesco Tripoli.

Role: Supervisor (with L. Ridolfi)

2020-present **Research Project**

Title: "Computational fluid dynamics of the lenticulostriate arteries during atrial fibrillation", Università degli Studi di Torino, Politecnico di Torino, Universitair Medisch Centrum Utrecht.

Role: Scientific advisor

2019-2020 **Post-Doc Research Fellowship**

Research Topic: "Application of the complex network theory for the analysis of wall turbulence (CNTURB)". Fellowship awarded to Giovanni Iacobello.

Role: Supervisor (with L. Ridolfi)

Dec, 2017 **FFABR Grant**

MIUR Funds for financing fundamental research activities.

2017 **Post-Graduate Research Fellowship "Ernesto e Ben Omega Petrazzini", Accademia delle Scienze di Torino**

Research Topic: "Effects of acceleration on human blood circulation for aerospace applications". Fellowship awarded to Caterina Gallo.

Role: Supervisor

2017-2020 **Compagnia di San Paolo - UNITO Excellent Young PI Research Project, CSTO160444**

Title: "Cerebral hemodynamics during atrial fibrillation", Università degli Studi di Torino and Politecnico di Torino.

Role: Participant

2016 **Post-Graduate Research Fellowship "Ernesto e Ben Omega Petrazzini", Accademia delle Scienze di Torino**

Research Topic: "Advanced techniques for the analysis of turbulent flows: application to the complex network theory". Fellowship awarded to Giovanni Iacobello.

Role: Supervisor

2013-2014 **ISCRA Project Class C HP10CGPPAA, IsC15 (CINECA)**

Title: "Acoustic and turbulence numerical simulations", Politecnico di Torino.

Role: Participant

2012-2013 **ISCRA Project Class C HP10CKRIG3, IsC09 (CINECA)**

Title: "Technical assessment of MPI code and development and comparison of hybrid openMP/MPI code for the solution of the Navier-Stokes equations", Politecnico di Torino.

Role: Participant

2010-2011 **ISCRA Project Class A HP10AJ2GTB, IsA01 (CINECA)**

Title: "Turbulent mixing and diffusion", Politecnico di Torino.

Role: Participant

2009-2012 **MITOR Project between MIT and Politecnico di Torino**

Title: "Long term interaction in flow systems".

Role: Participant

2005-2010 **Regione Piemonte Project E59**

Title: "New concepts and methodologies for the development of innovative ultralight aircrafts", Politecnico di Torino.

Role: Participant

2006-2010 **Internationalization Programme between the Politecnico di Torino and the University of Washington**

Title: "Joint actions in the field of fundamental and applied fluid dynamics".

Role: Participant

2005-2007 **PRIN**

Title: "Mean-long term evolution of hypersonic jets: visualization, density and concentration measurements, numerical simulation. Application to the stellar jets".

Role: Participant

Computer Skills

Software Environments	Matlab, Mathematica, R
Programming Languages	Fortran 77, C
Commercial Software	Altair HyperMesh, Abaqus, MSC Nastran, MSC Fatigue
Markup Languages	LaTex, HTML
Web Development	Languages: PHP, CSS, JS. Database Management System: MySQL. Content Management System: Joomla
OS	Microsoft Windows, Linux

Linguistic Knowledge

Italian	Native
English	Very Good (First Certificate in English, December 1999)
French	Basic

Education

Mar, 2008 **Doctor of Philosophy, Fluid Dynamics**
Department of Aeronautics and Space Engineering, Politecnico di Torino (XX Cycle), Torino, Italy

Thesis: Hydrodynamic linear stability of the two-dimensional bluff-body wake through modal analysis and initial-value problem formulation

Advisor: Prof. D. Tordella

Dec, 2004 **Master of Science, Mathematical Engineering**
Politecnico di Torino, Torino, Italy

Thesis: Linear stability of non-parallel flows. Multiscale analysis applied to the bluff-body wake

Advisor: Prof. D. Tordella

Marks: 110/110 *cum laude*

Oct, 2002 **Bachelor of Arts, Mathematics for Engineering Sciences**
Politecnico di Torino, Torino, Italy

Thesis: Finite element formulation of eddy currents in terms of the magnetic potential

Advisor: Prof. M. Repetto

Marks: 105/110

Jul, 1999 **High School diploma**
Liceo Scientifico N. Copernico, Torino, Italy

Marks: 100/100