

# CURRICULUM VITAE ET STUDIORUM

## Nicola Parolini

### Personal Data

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Birth Place/Date ~~Vimercate (MI), Italy / July, 9th 1975.~~  
Nationality Italian  
Address MOX, Dipartimento di Matematica, Politecnico di Milano,  
P.zza Leonardo da Vinci 32, 20133 Milano, Italia  
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### Professional Experience

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Feb 2015-Present Associate Professor in Numerical Analysis, Department of Mathematics, Politecnico di Milano.  
Oct 2007-Feb 2015 Assistant Professor in Numerical Analysis, Department of Mathematics, Politecnico di Milano.  
Jul 2009 Visiting period as academic guest, Chair of Modeling and Scientific Computing (CMCS), Ecole Polytechnique Fédérale de Lausanne (EPFL).  
Jul 2007-Sep 2007 Research activity as scientific collaborator, Department of Mathematics, Politecnico di Milano.  
Dec 2004-Jun 2007 Research and teaching activity as Post-Doc assistant, Chair of Modeling and Scientific Computing (CMCS), EPFL (supported by a CTI grant).  
Jun 2001-Dec 2004 Research and teaching activity as PhD student, Chair of Modeling and Scientific Computing (CMCS), EPFL (funded by an EPFL grant).  
Sep 2000-Nov 2000 Research stage at LIMSI (Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur), Orsay, France (supported by CNRS).  
Apr 2000-Set 2000 Research activity as scientific collaborator, Department of Aerospace Engineering, Politecnico di Milano.

### Education

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Dec 2004 PhD in Applied Mathematics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.  
Apr 2000 Laurea Degree in Aerospace Engineering, Politecnico di Milano, Italy.



- [J9] G. NEGRINI, N. PAROLINI, AND M. VERANI, A diffuse interface box method for elliptic problems, *Appl. Math. Lett.*, **120**, 107314, 2021.
- [J10] R. PORCÙ, E. MIGLIO, N. PAROLINI, M. PENATI AND N. VERGOPOLAN, HPC simulations of brownout: a non-interacting particles dynamic model, *International Journal of High Performance Computing Applications*, **34(3)**, 267–281, 2020.
- [J11] C. ANDRÀ, D. BRUNETTO, N. PAROLINI AND M. VERANI, Four Fundamental Modes of Participation in Mathematics Group Activities, *International Journal of Science and Mathematics Education*, **18(1)**, 123–143, 2020.
- [J12] E. MIGLIO, N. PAROLINI, M. PENATI AND R. PORCÙ, High-Order Variational Time Integrators for Particle Dynamics, *Communications in Applied and Industrial Mathematics (CAIM)*, **9 (2)**, 34–49 2018.
- [J13] C. ANDRÀ, D. BRUNETTO, N. PAROLINI AND M. VERANI, Student interactions during class activities: A mathematical model, *Communications in Applied and Industrial Mathematics (CAIM)*, **9 (2)**, 91–105, 2018.
- [J14] I. FUMAGALLI, N. PAROLINI AND M. VERANI, Optimal control in ink-jet printing via instantaneous control, *Computers&Fluids*, **172**, 264–273, 2018.
- [J15] M. TAMELLINI, N. PAROLINI AND M. VERANI, An optimal control problem for two-phase compressible–incompressible flows, *Computers&Fluids*, **172**, 538–548, 2018.
- [J16] F. REGAZZONI, N. PAROLINI AND M. VERANI, Topology optimization of multiple anisotropic materials, with application to self-assembling diblock copolymers, *Computer Methods in Applied Mechanics and Engineering*, **338**, 562–596, 2018.
- [J17] M. BRUGGI, N. PAROLINI, F. REGAZZONI AND M. VERANI, Topology Optimization with a time-integral cost functional, *Finite Elements in Analysis and Design*, **140(15)**, 11–22, 2018.
- [J18] I. FUMAGALLI, N. PAROLINI AND M. VERANI, On a free-surface problem with moving contact line: from variational principles to stable numerical approximations, *Journal of Computational Physics*, **355**, 253–284, 2017.
- [J19] I. FUMAGALLI, A. MANZONI, N. PAROLINI AND M. VERANI, Reduced basis approximation and a posteriori error estimates for parametrized elliptic eigenvalue problems, *ESAIM: Mathematical Modelling and Numerical Analysis*, **50**, 1857–1885, 2016.
- [J20] G. BERLUSCONI, F. CALDERONI, N. PAROLINI, M. VERANI AND C. PICCARDI, Link Prediction in Criminal Networks: A Tool for Criminal Intelligence Analysis, *PLoS ONE*, **11(4)**, 2016.
- [J21] I. FUMAGALLI, N. PAROLINI AND M. VERANI, Shape Optimization for Stokes flows: a finite element convergence analysis, *ESAIM: Mathematical Modelling and Numerical Analysis (M2AN)*, **49(4)**, 921–951, 2015.
- [J22] A. BARTEZZAGHI, M., CREMONESI, N. PAROLINI AND U. PEREGO, An explicit dynamics GPU structural solver for thin shell finite elements, *Computers & Structures*, **154**, 29–40, 2015.



- [J37] F. AUTERI AND N. PAROLINI, A mixed-basis spectral projection method, *J. Comp. Phys.* **175**, 1–23 (2002).
- [J38] F. AUTERI, J.-L. GUERMOND AND N. PAROLINI, Role of the LBB condition in weak spectral projection methods, *J. Comp. Phys.* **174**, 405–420 (2001).

#### Refereed Conference Proceedings

- [C1] C. ANDRÀ, D. BRUNETTO, N. PAROLINI, M. VERANI, Teen-Immigrants Explore a Math Mobile App, in *Proceedings of The 14th International Conference on Technology in Mathematics Teaching – ICTMT 14*, Essen, Germany, University of Duisburg-Essen, 237–244, 2019.
- [C2] M. BRUGGI, N. PAROLINI, F. REGAZZONI AND M. VERANI, Finite element approximation of a time-dependent topology optimization problem, in *Proceedings of the VII European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2016)*, M. Papadrakakis, V. Papadopoulos, G. Stefanou, V. Plevris (Eds.), 2016.
- [C3] C. ANDRÀ, D. BRUNETTO, N. PAROLINI AND M. VERANI, ‘I can–you can’: Cooperation in group activities, in *Proceedings of the Ninth Congress of the European Society for Research in Mathematics Education (CERME9)*, K. Krainer and N. Vondrová (Eds.), 2015.
- [C4] E. MIGLIO, N. PAROLINI, M. PISCHIUTTA, Impact of water depth on rowing fairness, in *Proceedings of the VI International Conference on Computational Methods in Marine Engineering, MARINE 2015*, 682–693, 2015.
- [C5] D. PERI, N. PAROLINI, F. FOSSATI, Multidisciplinary design optimization of a sailplan, in *Proceedings of the VI International Conference on Computational Methods in Marine Engineering, MARINE 2015*, 177–187, 2015.
- [C6] M. LOMBARDI, N. PAROLINI, Unsteady FSI simulations of downwind sails, in *Proceedings of the V International Conference on Computational Methods in Marine Engineering, MARINE 2013*, B. Brinkmann and P. Wriggers (Eds), 2013.
- [C7] M. LOMBARDI, M. CREMONESI, A. GIAMPIERI, N. PAROLINI, A. QUARTERONI, A strongly coupled fluid-structure interaction model for wind-sail simulation, in *Proceedings of the 4th High Performance Yacht Design conference*, The Royal Institution of Naval Architects, London, UK, 2012.
- [C8] N. PAROLINI AND A. QUARTERONI, Modelling and numerical simulation for yacht design, in *Proceedings of the 26th Symposium on Naval Hydrodynamics, Rome, Italy, 17–22 September 2006*, Arlington, USA, 2007.
- [C9] N. PAROLINI AND A. QUARTERONI, Numerical Simulation for Yacht Design. in *Computer Mathematics and its Application: Advances and Developments (1994–2005)*, E.A. Lipitakis, (ed.), pp. 489–495, LEA Publishers, Athens, 2006.
- [C10] G. W. COWLES, N. PAROLINI AND M. L. SAWLEY, Numerical Simulation using RANS-based Tools for America’s Cup Design, in *Proceedings of the 16th Chesapeake Sailing Yacht Symposium*, pp. 111–126, CSYS, Annapolis, 2003.



- [D4] C. ANDRÀ, N. PAROLINI AND M. VERANI, I can – you can: cooperation in group activities, in Proceedings of the 9th Conference of the European Research in Mathematics Education, 2015.
- [D5] C. ANDRÀ, D. BRUNETTO, N. PAROLINI AND M. VERANI, Teachers’ perspectives on group dynamics, in Proceedings of the 9th Conference of the European Research in Mathematics Education, 2015.
- [D6] C. ANDRÀ, N. PAROLINI AND M. VERANI, Probability and gambling abuse, in Proceedings of the 38th Conference of the Psychology of Mathematica Education. Vancouver, CA, 2014.
- [D7] C. ANDRÀ, N. PAROLINI AND M. VERANI, L’analfabetismo matematico e l’illusione di vincere, in *Vite in gioco. Oltre l’economia slot*, a cura di Carlo Cefaloni, Città Nuova Editrice, 2014.
- [D8] N. PAROLINI AND M. VERANI, Un progetto di Matematica Civile. BetOnMath: Matematica e gioco d’azzardo, published online on *MATEpristem*, 2013.
- [D9] N. PAROLINI , Modellistica matematica per lo sport, *Lettera Matematica Pristem*, 70-71, pp. 63–66, 2009.
- [D10] G. FOURESTY, N. PAROLINI, C. PRUDHOMME, A. QUARTERONI AND G. ROZZA, Matematica in Volo, in *Matematica e Cultura 2006*, M. Emmer (Ed.), pp. 35–48, Springer Italia, Milano, 2006.
- [D11] N. PAROLINI , Modelli matematici per la Coppa America, in *Atti del Convegno “Scuola Scienza e Società”*, a cura di S. Seatzu, R. Capriala, D. Tobbia, pp. 171–176, Paolo Sorba Editore, La Maddalena, 2006.
- [D12] A. QUARTERONI E N. PAROLINI , Quando la matematica va in barca (in Coppa America), in *Matematica e Cultura 2004*, M. Emmer Ed., pp. 207–213, Springer Italia, Milano, 2004.

## Funded Research and Consulting Projects

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- [P1] Principal investigator of the industrial consulting project *Modeling and simulations of dispersive and distributing mixing in continuous mixing processes - VI*, 2022 (12 months). Contractor: Pirelli Tyres.
- [P2] Principal investigator of the industrial consulting project *Modeling and simulations of dispersive and distributing mixing in continuous mixing processes - V*, 2021 (12 months). Contractor: Pirelli Tyres.
- [P3] Coordinator of the local unit of the European Project *Burner 4.0 - Development of a new burner concept: Industry 4.0 technologies applied to the best available combustion system for the Steel Industry* (Project ID:847237, Call: RFCS-2018), 2019-2023 (48 months).
- [P4] Principal investigator of the industrial consulting project *Sviluppo modelli ridotti e ottimizzazione per fluidodinamica*, 2021 (12 months). Contractor: MOXOFF s.p.a. (in collaboration with TetraPak Packaging Solution s.p.a.).



- [P19] Principal investigator of the industrial consulting project *Modeling and simulations of dispersive and distributing mixing in continuous mixing processes*, 2017 (12 months). Contractor: Pirelli Tyres.
- [P20] Principal investigator of the industrial consulting project *Development of a multi-scale non-Newtonian FSI model*, 2016 (12 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).
- [P21] Principal investigator (with M. Verani) of the project *Math Inside*, 2015-2016 (12 months), supported by the italian ministry of university and research (MIUR) in collaboration with Museo Nazionale della Scienza e Tecnologia di Milano.
- [P22] Principal investigator (with E. Miglio) of the industrial research project *Performance evaluation of rowing boats*, 2014 (3 months). Contractor: Filippi Lido s.r.l.
- [P23] Principal investigator of the industrial consulting project *Hybrid framework development and engineering for the numerical simulation of the complete packaging line*, 2014-2015 (10 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).
- [P24] Principal investigator (with E. Miglio) of the industrial research project *Evaluation of minimum depth for a rowing course*, 2013-2014 (12 months). Contractor: Fédération Internationale des Sociétés d'Aviron (FISA).
- [P25] Principal investigator (with M. Verani) of the research project *BetOnMath: Mathematics for problem gambling prevention*, 2013-2015 (24 months), supported by Politecnico di Milano through the *5x mille* Polisocial Award.
- [P26] Principal investigator of the industrial consulting project *Identification of an hybrid framework for the numerical simulation of the complete packaging line*, 2013 (7 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).
- [P27] Principal investigator of the industrial consulting project *Engineering of 1D numerical models for the integrated simulation of packaging systems*, 2012 (5 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).
- [P28] Principal investigator of the industrial consulting project *Development of multiscale numerical models for the simulation of fluid-structure interaction for packaging applications*, 2011-2012 (8 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).
- [P29] Participant in the national research project *Numerical Models for Scientific Computing and Advanced Applications* (PRIN2009), 2011-2013 (24 months) (coordinator: A. Quarteroni).
- [P30] Principal investigator of the industrial consulting project *Mathematical and numerical modeling of an industrial washing machine*, 2011 (2 months). Contractor: MOXOFF s.r.l. (in collaboration with IWT s.r.l.).
- [P31] Principal investigator (with L. Formaggia) of the industrial consulting project *Modeling analysis and feasibility study for the numerical simulation of FSI problems*, 2010-2011 (4.5 months). Contractor: MOXOFF s.r.l. (in collaboration with TetraPak Packaging Solution s.p.a.).



- May 22nd, 2020 *Matematica contro l'azzardo, Indam-INDIRE Webinar Online.* (Invited)
- Jul 23rd, 2019 *Model reduction applied to packaging systems, "1st Conference on Transfer between Mathematics & Industry (CTMI 2019)",* Santiago de Compostela, Spain.
- May 2nd, 2018 *Modellare la complessità: potenzialità e limiti della fluidodinamica numerica applicata alle imbarcazioni ed al corpo umano, Workshop CONI "Idrodinamica e prestazione negli sport acquatici: sfide e soluzioni",* Roma, Italia. (Invited)
- Jun 28th, 2017 *Mathematical models for sport: America's Cup, Olympic Rowing and more, "MathSport International 2017",* Padova, Italia.
- Jul 7th, 2017 *Finite-element simulation and optimal control of free-surface problems, "14th U.S. National Congress on Computational Mechanics",* Montreal, Canada. (Invited)
- Jun 28th, 2017 *Mathematical models for sport: America's Cup, Olympic Rowing and more, "MathSport International 2017",* Padova, Italia.
- Nov 22nd, 2016 *Fluid-structure interaction and geometrical multi-scale models for packaging systems, "IHP quarter on Numerical Methods for PDEs, Workshop Industry and Mathematics",* Paris, France. (Invited)
- Jun 22nd, 2016 *Bet on Math: un progetto di Matematica Civile, "XII Conferenza Nazionale di Statistica",* Rome, Italy. (Invited)
- Jun 9th, 2016 *Finite element approximation of a time-dependent topology optimization problem, "ECCOMAS Congress 2016",* Crete, Greece.
- Mar 18th, 2016 *Matematica e sport: dalla ricerca alle applicazioni sul campo da gioco, "Festival Pi Greco 2016",* Rovigo, Italy. (Invited)
- Jun 17th, 2016 *Impact of water depth on rowing fairness, "VI International Conference on Computational Methods in Marine Engineering, MARINE 2015",* Rome, Italy.
- Feb 23rd, 2015 *Vincere e (non) perdere con la Matematica, Workshop "La Matematica Applicata per una Buona Scuola",* Rome, Italy. (Invited)
- Nov 21st, 2014 *Matematica e sport: la modellistica numerica a supporto delle prestazioni, "I Lincei per la scuola",* Centro Lincoo Interdisciplinare Beniamino Segre sulle Scienze Informatiche, Milan, Italy. (Invited)
- Jul 21st, 2014 *Multi-scale fluid-structure interaction models for integrated packaging systems, XI World Congress on Computational Mechanics, WCCM XI,* Barcelona, Spain.
- Oct 11th, 2013 *Modellistica matematica e numerica per la vela (e non solo), Workshop On the wings of wind,* Trieste, Italy. (Invited)
- May 30th, 2013 *Unsteady FSI simulations of downwind sails, V International Conference on Computational Methods in Marine Engineering, MARINE 2013,* Hamburg, Germany. (Invited)
- Jan 16th, 2013 *A strongly coupled FSI algorithm for sail dynamics, Software Frameworks for Challenging Computational Problems,* Heraklion, Greece. (Invited)
- Nov 27th, 2012 *Numerical models for sailing yachts: from hull dynamics to wind/sails FSI, HPC enabling of OpenFOAM for CFD applications, CINECA,* Casalecchio di Reno, Italy. (Invited)
- Sep 28th, 2012 *Matematica e Sport, MeetMeTonight, La Notte dei Ricercatori,* Milano, Italy.
- Jun 27th, 2012 *Multi-scale numerical models for fluid-structure interaction problems in packaging applications, Congresso Nazionale SIMAI,* Torino, Italy.

- May 28th, 2012 *Scientific computing in action: some experiences at MOX, MOX10: Immaginare il Futuro con uno Sguardo al Passato*, Milano, Italy.
- Feb 23rd, 2012 *Free-surface hydrodynamics of racing yachts*, Free Surface Flows: Numerical Methodologies and Application to Naval Architecture SISSA, Trieste, Italy. (Invited)
- Dec 9th, 2011 *Academic/industrial partnership for sailing yacht design*, Rencontre SMAI math-industrie Voile et Innovation Mathématique, ENSTA, Paris, France.
- Jun 9th, 2011 *Metodi numerici a supporto della progettazione in America's Cup*, Facolt'a di Ingegneria di Bergamo, Italy. (Invited)
- May 11th, 2011 *Modelli matematici e simulazioni numeriche per lo sport*, Seminari di Cultura Matematica, Politecnico di Milano, Italy. (Invited)
- Mar 7th, 2011 *Numerical models for America's Cup yacht design*, Computing in Image Processing, Computer Graphics, Virtual Surgery, and Sports IMA, Minneapolis, USA. (Invited)
- Jun 28th, 2010 *Risultati del progetto Energ-IT*, Convegno Energ-IT: modelli e strumenti per la riduzione di costi e consumi energetici dei data center, Milano, Italy.
- Jun 25th, 2010 *Recent advances in rowing boat modeling.*, SIMAI Congress 2010, Cagliari, Italy.
- Jun 17th, 2010 *A three-dimensional model for rower dynamics and free-surface hydrodynamics of rowing boats*, ECCOMAS CFD 2010, Lisbona, Portugal.
- Sep 9th, 2009 *Numerical models for ship dynamics and free-surface hydrodynamics*, Mathematical Physics and PDEs, Levico Terme, Italia.
- Jul 15th, 2009 *Numerical simulation of ship free-surface hydrodynamic problems*, CMCS Seminar, EPFL, Lausanne, Switzerland. (Invited)
- Sep 13th, 2008 *Numerical simulations for the performance analysis of a swimmer*, SIMAI Congress 2008, Rome, Italy.
- Jun 4th, 2008 *Modeling and simulation for America's Cup Yacht Design*, Seminar "Matematica e Vela", SISSA, Trieste, Italy. (Invited)
- Jun 15th, 2007 *A finite-element approximation of the Level Set Method for free-surface flows*, RWTH Workshop on "Two-phase incompressible flows" Aachen, Germany. (Invited)
- Nov 14th, 2006 *Numerical Simulation of Laminar-Turbulent Transition Flow in America's Cup Yacht Design*, ANSYS Seminar on "Simulation of turbulent flows", Munich, Germany. (Invited)
- Aug 18th, 2005 *A new reinitialization procedure for the finite element approximation of the level set equation*, ENUMATH 2005, Santiago de Compostela, Spain.
- Jun 16th, 2005 *The Role of Computational Fluid Dynamics in America's Cup Yacht Design*, CADFEM Users' Meeting 2005, Zurigo, Switzerland. (Invited)
- Mar 24th, 2005 *A new reinitialization procedure for the finite element approximation of the level set equation*, Colloquium Numérique Suisse, University of Zurich, Switzerland.
- Feb 24th, 2005 *Modelli matematici per la Coppa America*, Convegno "Scuola, Scienza e Società", La Maddalena, Italy. (Invited)
- Sep 20th, 2004 *Un metodo Level-Set agli elementi finiti per flussi viscosi a superfice libera*, VII Congresso SIMAI, Venezia, Italy.

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- Apr 28th, 2004 *Finite Element Level Set Method for Viscous Free Surface Flows*, Journées de Metz “Problèmes de frontières libres: Méthodes mathématiques, Algoritmiques et Simulations, Applications”, Metz, France.
- Apr 24th, 2003 *Numerical Simulations for the America’s Cup*, Kolloquium des Graduiertenkollegs, Universität Hamburg, Germany. (Invited)
- Mar 28th, 2003 *Quando la matematica va in barca*, Convegno Matematica e Cultura, Venezia, Italy. (Invited)
- Giu 13th, 2001 *Simulation of the differentially-heated 8:1 rectangular cavity by a Galerkin-Legendre spectral projection method*, First M.I.T. Conference on Computational Fluid and Solid Mechanics, Cambridge, USA.
- Nov 20th, 2000 *First Hopf bifurcation in the singular driven cavity flow*, 4th EUROMECH Fluid Mechanics Conference, Eindhoven, Netherland.

## Awards and Honours

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- *5xmille Polisocial Award*, Politecnico di Milano (June 2013).
- Award for the best paper in the category *CFD Analysis with ANSYS* at the *CADFEM Users’ Meeting 2005*, Zurich, Switzerland (June 2005).
- Finalist of the *ECCOMAS Award 2004* for the Best Ph.D Thesis of 2004 on Computational Methods in Applied Sciences and Engineering (selected by the BFIT - Board of the Swiss Federal Institutes of Technology).
- Performance award of the *Faculté des Sciences de Base* of the EPFL (october 2003).
- *EUROMECH Young Scientist Prize 2000* for the best presentation, 4th EUROMECH Fluid Mechanics Conference, Eindhoven, Netherlands (November 2000).

## Teaching experience

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### Academic Year 2022/2023

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- *Applied Numerical Analysis*, Aerospace Engineering, Politecnico di Milano (70 hours, Teacher).

### Academic Year 2021/2022

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with C. Cerutti), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

### Academic Year 2020/2021

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with C. Cerutti), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2019/2020

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with C. Cerutti), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2018/2019

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with G. Mola), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2017/2018

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with E. Beretta), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2016/2017

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with G. Mola), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2015/2016

- Joint course *Computational Fluid Dynamics* (with L. Valdettaro), Mathematical Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with G. Cipriani), Energy Engineering, Politecnico di Milano (36 hours, Teacher).

- *Curves and Surfaces for Design*, Product Design, Politecnico di Milano, (36 hours, Teacher).

#### Academic Year 2014/2015

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence* (with L. Valdetaro), Mathematical Engineering, Politecnico di Milano (38 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with F. Cipriani), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

#### Academic Year 2013/2014

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence* (with L. Valdetaro), Mathematical Engineering, Politecnico di Milano (38 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with F. Cipriani), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

#### Academic Year 2012/2013

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence* (with L. Valdetaro), Mathematical Engineering, Politecnico di Milano (38 hours, Teacher).
- Joint course *Analytical and Numerical Methods for Engineering* (with F. Cipriani), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

#### Academic Year 2011/2012

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence* (with L. Valdetaro), Mathematical Engineering, Politecnico di Milano (72 hours, Teacher and teaching assistant).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

#### Academic Year 2010/2011

- Joint course *Analytical and Numerical Methods for Engineering* (with F. Colombo), Energy Engineering, Politecnico di Milano (36 hours, Teacher).
- Joint course *Scientific Computing for Fluid Dynamics and Turbulence*, Mathematical Engineering, Politecnico di Milano (36 hours, Teaching assistant; Teachers: L. Valdetaro and F. Nobile).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

### Academic Year 2009/2010

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence*, Mathematical Engineering, Politecnico di Milano (36 hours, Teaching assistant; Teachers: L. Valdettaro and F. Nobile).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

### Academic Year 2008/2009

- *Linear Algebra and Numerical Calculus*, Mechanical Engineering, Politecnico di Milano, (Teacher).
- Joint course *Scientific Computing for Fluid Dynamics and Turbulence*, Mathematical Engineering, Politecnico di Milano (36 hours, Teaching assistant; Teachers: L. Valdettaro and F. Nobile).
- *Numerical Modelling for Differential Problems*, Aerospace Engineering, Politecnico di Milano, (24 hours, Teaching assistant; Teacher: L. Formaggia).

### Academic Year 2007/2008

- Joint course *Scientific Computing for Fluid Dynamics and Turbulence*, Mathematical Engineering, Politecnico di Milano (36 hours, Teaching assistant; Teachers: L. Valdettaro and F. Nobile).
- *Linear Algebra and Numerical Calculus*, Ingegneria Meccanica, Politecnico di Milano (24 hours, Teaching assistant; Teacher: S. Micheletti).

### Academic Year 2005/2006

- *Introduction to Finite Element Method*, Ecole Polytechnique Fédérale de Lausanne (28 hours, Teaching assistant; Teacher: A. Quarteroni).

### Academic Year 2004/2005

- *Numerical Analysis*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant; Teacher: A. Quarteroni).

### Academic Year 2003/2004

- *Numerical Analysis*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant; Teacher: A. Quarteroni).
- *Mathematical Analysis II*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant; Teacher: M. Cibils).

### Academic Year 2002/2003

- *Numerical Analysis*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant; Teacher: E. Burman).
- *Mathematical Analysis III*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant, Teacher: Y. Biollay).

### Academic Year 2001/2002

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- *Numerical Analysis*, Ecole Polytechnique Fédérale de Lausanne (24 hours, Teaching assistant: Teacher: A. Quarteroni).

#### Academic Year 2000/2001

- *Abstract Linear Algebra*, Penn State University (Grading assistant, Teacher: Prof. R. Ware).
- *Numerical Computations*, Penn State University (Grading assistant, Teacher: Prof. J. Shen)

## Supervised Research Fellows

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### Post-doc

- G. NEGRINI, Topic: *PoliMIX: non-conforming approximation of polymeric continuous mixing*, 2023- (co-supervised with M. Verani).
- D. BRUNETTO, Topic: *Progetto TEEN: Teenagers Experience Empowerment by Numbers*, 2018-2020 (co-supervised with M. Verani).
- G. G. GIUSTERI, Topic: *Numerical simulation of drill-string systems*, 2018-2019.
- M. PISCHIUTTA, Topic: *Evaluation of minimum depth for a rowing course*, 2013-2014 (co-supervised with E. Miglio).

### Post-grad

- G. ARDENGHI, Topic: *Modelling the COVID-19 epidemic*, 2020-2021.
- UMBERTO VISCONTI, Topic: *Modelling and simulation of dispersive and distributive mixing*, 2016-2017.
- ERIK MAZZOLENI, Topic: *Thermo-fluido dynamic modeling of a green datacenter*, 2009-2010.
- FEDERICO BIONDI, Topic: *Numerical simulation of the flow around a swimmer*, 2007-2008.
- MATTEO LOMBARDI, Topic: *Numerical simulations of the flow around a multi-hull racing yacht*, 2008.

## Supervised Students

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### PhD

- E. CAPUANO, PhD program *Mathematical Models and Methods in Engineering* (XXXVIII ciclo), 2022-Ongoing (co-advisor: M. Verani).
- G. ZIARELLI, PhD program *Mathematical Models and Methods in Engineering* (XXXVII ciclo), 2021-Ongoing (co-advisor: M. Verani).
- A. ARTONI, PhD program *Mathematical Models and Methods in Engineering* (XXXVI ciclo), 2020-Ongoing (co-advisor: D. Rocchi).
- G. NEGRINI, PhD program *Mathematical Models and Methods for the Engineering* (XXXV ciclo), 2018-Ongoing (co-supervised with M. Verani).

- R. ZAMBETTI, PhD program *Mathematical Models and Methods for the Engineering* (XXXIV ciclo), 2018-Ongoing (co-supervised with E. Miglio).
- D. BRUNETTO, PhD program *Mathematical Models and Methods for the Engineering* (XXX ciclo), 2015-2018 (advisor: G. Magli, co-advisor: C. Andrà, N. Parolini, M. Verani).
- M. TAMELLINI, PhD program *Mathematical Models and Methods for the Engineering* (XXX ciclo), 2015-2018 (co-supervised with M. Verani).
- I. FUMAGALLI, PhD program *Mathematical Models and Methods for the Engineering* (XXIX ciclo), 2014-2017 (co-supervised with M. Verani).

## Master

- L. PIANELLI, Modeling of the morphodynamic evolution of a beach in a microtidal environment with XBeach, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2022.
- G. FERLA, Non-Intrusive Reduced Order Methods for industrial flow simulations, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2022.
- S. CAPUTI, A regression based reduced order model for industrial applications, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2022.
- A. CORTESI, Mathematical Modelling of Rheology of Filled Compounds, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2021.
- M. GUIDO, Modeling hysteresis in orbital sloshing, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2021.
- M. GUIDO, Modeling hysteresis in orbital sloshing, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2021.
- G. DALLA VERDE, Mcsh motion analysis applied to a food packaging system, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2021.
- T. BUGUBAYEV, Development of CFD method for condenser design optimization, Master Thesis in Energy Engineering, POLITECNICO DI MILANO, 2020.
- D. DI LORENZO, Validation of an LBM solver for the aerodynamic and aeroacoustic study of a propeller, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020.
- C. BELPONER, Adjoint-based topology optimization for three-dimensional ducted flows with heat transfer, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020.
- G. GARGANTINI, Design of bi-fluid heat exchangers using topology optimization, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020.
- G. ARDENGHI, Optimization of International Moth hydrofoil using divergence-free global algorithms, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020.
- E. CHIMISSO, Topology optimization for heat transfer problems: towards a finite element based neural network approach, Master Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020.

- N. DISCACCIATI, Controlling oscillations in high-order schemes using neural networks, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2018 (advisors: J. S. Hesthaven and N. Parolini).
- D. LOSAPIO, Analysis of Tesla-type valveless micropumps, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2018 (advisor: N. Parolini).
- D. SACCO, A 3D Adaptive Boundary Element Method for Potential Flow with Nonlinear Kutta Condition, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2018 (advisor: N. Parolini, co-advisor: A. Mola).
- F. REGAZZONI, Topology optimization of self-assembling anisotropic materials, POLITECNICO DI MILANO, 2016 (advisor: M. Verani, co-advisor: S. Berrone and N. Parolini).
- M. TAMELLINI, Analisi fluidodinamica dell'influenza del parabrezza sul flusso attorno ad un casco da motocicletta, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2014 (advisor: N. Parolini, co-advisor: M. Longoni).
- P. PARUTA, Modelling dust grain coagulation in molecular clouds, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisors: N. Parolini and R. Keppens, co-advisor: T. Hendrix).
- I. FUMAGALLI, Shape optimization for Stokes flows: a reference-domain approach, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisors: N. Parolini and M. Verani).
- F. PORCÙ, Metodi numerici e tecniche di programmazione per l'accelerazione di un modello di dinamica di particelle non interagenti, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisors: N. Parolini and E. Miglio, co-advisor: M. Penati).
- A. BARTEZZAGHI, GPU implementation of a shell element structural solver aimed at fluid-structure interaction problems, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisor: A. Quarteroni, co-advisors: N. Parolini and M. Cremonesi).
- N. SACCENTI, Development of a multi-purpose velocity prediction program for sailing yachts, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisor: I. M. Viola, co-advisor: N. Parolini).
- V. BISSARO, Un approccio libero all'ottimizzazione di un bulbo per un'imbarcazione classe 950, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2012 (advisor: L. Formaggia, co-advisor: N. Parolini).
- N. D. SIST, Hydrodynamic model for a semi-submersible floating wind turbine, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2011 (advisors: N. Parolini, H. Bredmose).
- M. MAFFIOLETTI, Simulazione numerica di flussi in campo automobilistico con software open-source, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2011 (advisor: L. Formaggia, co-advisor: N. Parolini).
- D. L. CONTI, Numerical simulation of a boat's hull with an open-source CFD code, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2010 (advisor: A. Quarteroni, co-advisors: N. Parolini and M. Lombardi).

- E. LEUCCI, Simulazione numerica ed ottimizzazione di turbine eoliche ad asse verticale, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2010 (advisor: L. Formaggia, co-advisor: N. Parolini).
- S. CARCANO, A model for cell growth in batch bioreactors, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2010 (advisor: N. Parolini).
- A. MANZONI, Ottimizzazione di forma per problemi di fluidodinamica: analisi teorica e metodi numerici, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2008 (advisor: S. Salsa, co-advisor: N. Parolini).
- D. DE SANCTIS, M. PERRONE, Numerical analysis of fluid dynamics and oxygen diffusion in shaking bioreactors, Thesis in Mechanical Engineering, UNIVERSITÀ DI TOR VERGATA, ROMA, 2008 (advisor: A. Quarteroni, co-advisors: N. Parolini, G. Vairo).
- M. PISCHIUTTA, Dinamica di un'imbarcazione da canotaggio: simulazioni numeriche con un modello RANS, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2008 (advisor: L. Formaggia, co-advisor: N. Parolini).
- S. PIAZZA, Simulazioni numeriche della dinamica di uno scafo in mare ondoso, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2007 (advisor: L. Formaggia, co-advisor: N. Parolini).
- M. LOMBARDI, Simulazione numerica della dinamica di uno scafo, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2006 (advisor: A. Quarteroni, co-advisors: C. Canuto e N. Parolini).
- O. GRANDJEAN, Aerodynamic study for the Solar Impulse Airplane, Thesis in Mathematics, EPFL, Lausanne, 2005 (advisor: A. Quarteroni, co-advisor: N. Parolini).
- M. JOERG, Numerical investigations of wall boundary conditions for two-fluid flows, Thesis in Mathematics, ETHZ, Zurich, 2005 (advisors: A. Prohl and A. Quarteroni, co-advisors: E. Burman and N. Parolini).
- S. PANDINI, Simulazione numerica della dinamica di imbarcazioni da canotaggio, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2004 (advisor: A. Quarteroni, co-advisors: A. Placido and N. Parolini).
- A. MOLA, Computational fluid dynamics for flows around slender bodies with appendages, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2004 (advisor: A. Quarteroni, co-advisor: N. Parolini).
- B. CONSERVA, Simulazione numerica di flussi a superficie libera con applicazioni in idrodinamica navale, Thesis in Aeronautical Engineering, POLITECNICO DI MILANO, 2004 (advisor: A. Quarteroni, co-advisor: N. Parolini).

#### First level degree

- C. PELOSI, Thermal analysis of flange connection, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2020 (advisor: N. Parolini).
- S. AIRAGHI, La matematica al servizio dello sport, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2018 (advisor: N. Parolini).

- G. GUALTIERI, Un modello matematico a supporto del nuoto, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2017 (advisor: N. Parolini).
- A. CABASSI, Validation of traffic flow models on processed GPS data, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2013 (advisors: P. Goatin and N. Parolini).
- N. BELTRAMI, M. PORRO, Analisi parametriche della dinamica di una imbarcazione da canottaggio, Thesis in Mathematical Engineering, POLITECNICO DI MILANO, 2007 (advisors: L. Formaggia, co-advisors: A. Mola and N. Parolini).

## Refereeing Activity

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### Referee for journals

- Advances in Computer Science and Engineering
- Advances in Water Resources
- Applied Mathematics and Computation
- Applied Mathematical Modelling
- ASME Journal of Biomechanical Engineering
- Computer Methods in Applied Mechanics and Engineering
- Computer and Fluids
- ESAIM: Mathematical Modelling and Numerical Analysis
- European Journal of Mechanics - B/Fluids
- Finite Elements in Analysis and Design
- Journal of Computational Physics
- Journal of the Royal Society Interface
- Journal of Sport Sciences
- Mathematical Methods in the Applied Sciences
- Meccanica
- Ocean Engineering
- Revista Ingeniería e Investigación
- SIAM Journal on Scientific Computing

### Referee for PhD and Master theses

- Referee for 6 Master theses in Aeronautical Engineering, Politecnico di Milano.
- Referee for 1 Master theses in Music and Acoustic Engineering, Politecnico di Milano.

- Referee for 15 Master theses in Mathematical Engineering, Politecnico di Milano.
- Member of a PhD thesis jury in Applied Mathematics, Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste (2020).
- Member of 2 PhD theses jury in Applied Mathematics, Ecole Polytechnique Fédérale de Lausanne (2012, 2020).

## Organizing activity

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- Organizer of the Mini-Symposium "Recent Advances on the mathematical and numerical modeling of epidemics" at the SIMAI Congress, Matera, Italy (August 29, 2023).
- Organizer of the Mini-Symposium "Advanced numerical models for industrial applications based on the OpenFOAM library" at the 1st Math2Product (M2P2023) ECCOMAS Conference, Taormina, Italy (May 29, 2023).
- Organizer of the Mini-Symposium "Mathematical and Numerical Modelling of COVID-19 Epidemic" at the 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway (June 9, 2022)
- Organizer of the 3rd edition of the event "EDU-SIMAI: la matematica applicata incontra la scuola", SIMAI Congress 2020+2021, Parma (August 31, 2021)
- Organizer of the Minisymposium "Industrial Mathematics in action" at 1st Conference on Transfer between Mathematics & Industry (CTMI 2019), Santiago de Compostela, Spain.
- Organizer of the Minisymposium "Modeling, Simulation and Data Analysis for Sport" at Congresso SIMAI 2018, Roma.
- Member of the Organizing Committee of Congresso SIMAI 2016, Sep. 13-16, 2016, Milano.

## Service activity

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- Member of 1 Selection Committees for the admission to the PhD Program in Mathematical Models and Methods for Engineering, Politecnico di Milano (2019).
- Member of 25 Selection Committees for research fellows at the Department of Mathematics, Politecnico di Milano (since 2009).
- Member of 6 Selection Committees for teaching assistants at the Department of Mathematics, Politecnico di Milano (since 2013).
- Member of the Degree Committee for the Mathematical Engineering, Politecnico di Milano (since 2011).

Milan, August 26th, 2023

Nicola Parolini