

# Curriculum vitæ et studiorum

of *Marco Morandotti*

## Personal data

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<b>Work address</b>	Dipartimento di Matematica Politecnico di Torino Corso Duca degli Abruzzi, 24 10129 Torino, Italy	Office 3N, 3 <sup>rd</sup> floor ☎ +39 011 0907526 @ <a href="mailto:marco.morandotti@polito.it">marco.morandotti@polito.it</a> 🌐 <a href="http://staff.polito.it/marco.morandotti">staff.polito.it/marco.morandotti</a>

**Languages spoken** Italian (native language), English, Portuguese, Spanish (fluent), French (fair knowledge).

## Positions

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- **October 1, 2018 – Present:** *Ricercatore di tipo A* (assistant professor) at Politecnico di Torino, Italy.
- **December 15, 2016 – September 30, 2018<sup>1</sup>:** Postdoc in Mathematics at Technische Universität München, Germany.
- **September 1, 2014 – December 14, 2016<sup>2</sup>:** Postdoc in Applied Mathematics at SISSA — International School for Advanced Studies, Trieste, Italy.
- **October 1, 2011 – August 31, 2014<sup>3</sup>:** ICTI Postdoctoral Research Associate in Applied Mathematics
  - *April 1, 2013 – August 31, 2014:* Departamento de Matemática, Instituto Superior Técnico, Lisbon, Portugal.
  - *October 1, 2011 – March 31, 2013:* Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA, USA.

<sup>1</sup>Support for this position fully provided by the ERC Starting Grant [High-Dimensional Sparse Optimal Control](#) (until November 30, 2017) and the DFG Project *Identifikation von Energien durch Beobachtung der zeitlichen Entwicklung von Systemen* (FO 767/7).

<sup>2</sup>Support for this position fully provided by the ERC Advanced Grant [QuaDynEvoPro](#).

<sup>3</sup>Support for this position fully provided by the Fundação para a Ciência e a Tecnologia (Portuguese Foundation for Science and Technology) through the Carnegie Mellon Portugal Program under Grant FCT-UTA/CMU/MAT/0005/2009 *Thin Structures, Homogenization, and Multiphase Problems*.

## Career of studies

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- October 27, 2011 Ph.D. in Applied Mathematics, [SISSA — International School for Advanced Studies](#). *Self-propulsion in viscous fluids through shape deformation*; Advisors Prof. G. Dal Maso and Prof. A. DeSimone.
- September 22, 2011 MCA ([Master in Complex Actions](#), SISSA) diploma.
- February 5, 2008 [IUSS](#) diploma. *A variational problem in thin film theory*; Advisor Prof. E. Vitali, co-advisor Prof. F. Brezzi.
- July 17, 2007 M.Sc. in Mathematics, [University of Pavia](#), with mark 110/110 cum laude. *Some results on the regularity of the infinity laplacian equation*; Advisor Prof. U. P. Gianazza.
- July 15, 2005 B.Sc. in Mathematics, [University of Pavia](#), with mark 110/110 cum laude. *Introduzione alle tassellazioni auto-affini e ai legami con le basi di ondine (Introduction to self-affine tessellations and to their relations with wavelet bases)*; Advisor Prof. M. P. Bernardi.
- Alumnus of [IUSS — Institute for Advanced Study](#), Pavia, class B/1, 7<sup>th</sup> cycle.
- Alumnus of [Collegio Ghislieri](#) in Pavia from October 2002 to October 2007.
- July 2002, high school degree, [Liceo Scientifico Statale “N. Copernico”](#), Pavia; mark 100/100 cum laude.

## Students supervised

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**master theses** [Francesco Olivari](#) – *Analysis and simulation of the dynamics of a flagellated micro-swimmer* – IUSS Master thesis (co-advised with Prof. Henry Shum), 19/2/2018. Now Ph.D. student at the University of Groningen.

**bachelor theses** Emanuele Bombardi • Claudio D'Eramo • Roberto Marchello – Politecnico di Torino, 2019.

## Awards, grants, and prizes

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- Travel support for participating to [ICIAM 2019](#).
- GNAMPA Project 2019 *Analysis and optimisation of thin structures*, P.I.
- 27/07/2018 – 27/07/2024: Abilitazione Scientifica Nazionale, fascia II<sup>1</sup> (art. 16, comma 1, Legge 240/10).
- GNAMPA Project 2015 *Critical Phenomena in the Mechanics of Materials: a Variational Approach*, P.I.
- Winner of a study prize from Istituto Nazionale di Alta Matematica “F. Severi” (INdAM) in the year 2008.
- Winner of a PhD position (XXIII cycle) with scholarship at SISSA, Trieste, 2007-2011.
- Scholarship from Istituto Nazionale di Alta Matematica “F. Severi” (INdAM) for students of Laurea Specialistica degree course (M.Sc.) for the years 2005-2007.
- Scholarship from Collegio Ghislieri for a stay in July and August 2005 at St. John’s College, Cambridge.
- Winner of the IUSS - Institute for Advanced Study, Pavia study prize for the years 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007.
- Scholarship from Istituto Nazionale di Alta Matematica “F. Severi” (INdAM) for undergraduate students for the year 2002-2003, maintained by merit for the following two years.

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<sup>1</sup>Italian habilitation for the position of Associate Professor.

## Memberships

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EMS; GNAMPA (INdAM); SIAM; SIAG/MS; SIMAI; UMI.

MR Author ID: 945829. OrcID: 0000-0003-3528-6152. ResearchID: J-7862-2017.

## Publications — [preprint versions available on arXiv]

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- [26] M. Bonacini, E. Davoli, and M. Morandotti: *Analysis of a perturbed Cahn-Hilliard model for Langmuir-Blodgett films*. [arXiv:1809.07566](#). *Submitted*.
- [25] I. Lucardesi, M. Morandotti, R. Scala, and D. Zucco: *Upscaling of screw dislocations with increasing tangential strain*. [arXiv:1808.08898](#). *Submitted*.
- [24] L. Ambrosio, M. Fornasier, M. Morandotti, and G. Savaré: *Spatially Inhomogeneous Evolutionary Games*. [arXiv:1805.04027](#). *Submitted*.
- [23] P. van Meurs and M. Morandotti: *Discrete-to-continuum limits of particles with an annihilation rule*. *SIAM J. Appl. Math.* *to appear*. [arXiv:1807.11199](#).
- [22] I. Lucardesi, M. Morandotti, R. Scala, and D. Zucco: *Confinement of dislocations inside a crystal with a prescribed external strain*. *Riv. Mat. Univ. Parma*, **9**(2) (2018), 283–327.
- [21] G. Carita, J. Matias, M. Morandotti, and D. R. Owen: *Dimension reduction in the context of structured deformations*. *J. Elast.* **133**(1) (2018), 1–35.
- [20] M. Morandotti: *Structured Deformations of Continua: Theory and Applications*. In *Mathematical Analysis of Continuum Mechanics and Industrial Applications II*. Proceedings of the conference CoMFoS16, van Meurs, Kimura, Notsu *Editors*. *Mathematics for Industry* **30**, 125–136. Springer Singapore, 2018.
- [19] M. Morandotti: *Qualitative and quantitative properties of the dynamics of screw dislocations*. *AIMETA 2017 Proceedings of the XXIII Conference of the Italian Association of Theoretical and Applied Mechanics*. L. Ascione, V. Berardi, L. Feo, F. Fraternali, A. M. Tralli (eds.) vol. 2 (2017), 1062–1073.

- [18] M. Morandotti: *Structured deformations and applications*. PAMM Proc. Appl. Math. Mech. **17**(1) (2017), 711–712. Special Issue: 88th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Weimar 2017; Editors: C. Könke, Weimar, and C. Trunk, Ilmenau.
- [17] T. Hudson and M. Morandotti: *Properties of screw dislocation dynamics: time estimates on boundary and interior collisions*. SIAM J. Appl. Math. **77**(5) (2017), 1678–1705.
- [16] M. Morandotti: *Boundary Behaviour and Confinement of Screw Dislocations*. MRS Advances **48** (2017), 2633–2638.
- [15] A. C. Barroso, J. Matias, M. Morandotti, and D. R. Owen: *Second-order structured deformations: relaxation, integral representation and applications*. Arch. Rational Mech. Anal. **225** (2017), 1025–1072.
- [14] J. Matias, M. Morandotti, and E. Zappale: *Optimal Design of Fractured Media with Prescribed Macroscopic Strain*. Journal of Mathematical Analysis and Applications **449** (2017), 1094–1132.
- [13] A. C. Barroso, J. Matias, M. Morandotti, and D. R. Owen: *Explicit Formulas for Relaxed Disarrangement Densities Arising from Structured Deformations*. Math. Mech. Complex Syst. **5**(2) (2017), 163–189.
- [12] G. A. Bonaschi, P. van Meurs, and M. Morandotti: *Dynamics of screw dislocations: a generalised minimising-movements scheme approach*. Eur. J. Appl. Math. **28**(4), (2017), 636–655.
- [11] T. Blass and M. Morandotti: *Renormalized Energy and Peach-Köhler Forces for Screw Dislocations with Antiplane Shear*. J. Convex Anal. **24**(2) (2017), 547–570.
- [10] G. Dal Maso and M. Morandotti: *A model for the quasistatic growth of cracks with fractional dimension*. Nonlinear Analysis Series A: Theory, Methods & Applications **154** (2017), 43–58.
- [9] J. Matias and M. Morandotti: *Homogenization problems in the calculus of variations: an overview*. São Paulo Journal of Mathematical Sciences **9**(2) (2015), 162–180.
- [8] M. G. Persico, L. Lodola, F. E. Buroni, M. Morandotti, P. Pallavicini, C. Aprile:  *$^{99m}\text{Tc}$  - Human Serum Albumin nanocolloids: particle sizing and radioactivity distribution*. Journal of Labelled Compounds and Radiopharmaceuticals **58**(9) (2015), 376–382.
- [7] J. Matias, M. Morandotti, and P. M. Santos: *Homogenization of functionals with linear growth in the context of  $A$ -quasiconvexity*. Appl. Math. Optim. **72**(3) (2015), 523–547.
- [6] T. Blass, I. Fonseca, G. Leoni, and M. Morandotti: *Dynamics for Systems of Screw Dislocations*. SIAM J. Appl. Math. **75** (2015), 393–419.
- [5] G. Dal Maso, A. DeSimone, and M. Morandotti: *One-dimensional swimmers in viscous fluids: dynamics, controllability, and existence of optimal control*. ESAIM Control Optim. Calc. Var. **21** (2015), 190–216.
- [4] R. Choksi, M. Morandotti, and M. Veneroni: *Global minimizers for axisymmetric multiphase membranes*. ESAIM Control Optim. Calc. Var. **19** (2013), 1014–1029.
- [3] M. Morandotti: *Self-propelled micro-swimmers in a Brinkman fluid*. Journal of Biological Dynamics **6** Iss. sup1 (2012), 88–103.
- [2] G. Bertolini, C. Rossi, D. Crespi, S. Finazzi, M. Morandotti, S. Rossi, M. Peta, M. Langer, and D. Poole: *Is  $A(H1N1)$  influenza pneumonia more severe than other community-acquired pneumonias? The result of the GiViTI survey on 155 Italian ICUs*. Intensive Care Medicine **37** (2011), 1746–1755.
- [1] G. Dal Maso, A. DeSimone, and M. Morandotti: *An existence and uniqueness result for the dynamics of micro-swimmers*. SIAM J. Math. Anal. **43** (2011), 1345–1368.

## Invited seminars

- forthcoming** *The 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019)* (MS: Mean Field Games and Applications and MS: Mathematical Models for Solid Mechanics and Soft Structures), Valencia, 15–19/7/2019.  
*Calculus of Variations on Schiermonnikoog*, 1–5/7/2019.
- 2019** *International Conference on Elliptic and Parabolic Problem* (MS17: Nonlinear evolutions problems and mathematical modeling), Gaeta, 21/5 • *Workshop on Calculus of Variations and Applications*, Salerno, 18/5 • DeustoTech, Bilbao, 21/3 • University of Utrecht, 14/3 • *The mathematical design of new materials*, Isaac Newton Institute, 26/2 • AMS-MAA JMM (SS46: Multiscale Problems in the Calculus of Variations), Baltimore, 18/1.
- 2018** *Joint PTM-SIMAI-UMI mathematical meeting*, Wrocław, 19/9 • *Fifth Workshop on Thin Structures*, Naples, 14/9 • Instituto Superior Técnico, 28/8 • *New trends in the variational modeling of failure phenomena*, ESI Vienna, 20/8 • Kanazawa Analysis Seminar, University of Kanazawa, 20/7 • *The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications* (SS131: Mean Field Games and Applications and SS144: Analytic properties and numerical approximation of differential models arising in applications), Taipei, 5–9/7 • CNA Seminar, Carnegie Mellon University, 29/5 • *Topics in the Calculus of Variations: Recent Advances and New Trends*, BIRS, Banff, 22/5 • University of Waterloo, 14/5 • Università di Pisa, 18/4 • Séminaire Equations aux dérivées partielles, Université de Strasbourg, 27/3 • Langenbach-Seminar, WIAS Berlin, 21/2.

- 2017** Groupe de Travail CalVa, Paris VII, 25/9 • Università del Sannio, 14/9 • AIMETA 2017, Salerno, 4/9 • *Analysis of Dislocation Models for Crystal Defects*, BIRS-CMO, Oaxaca, 25/6 • Ohio University, 25/4 • University of Warwick, 22/2 • *Miniworkshop on dislocations, plasticity, and fracture*, SISSA, 13/2.
- 2016** University of Kanazawa, 28/10 • International conference *CoMFOs16: Mathematical Analysis of Continuum Mechanics and Industrial Applications II*, Kyushu University, 23/10 • Workshop *Variational and hamiltonian structures: models and methods*, ESL, Vienna, 12/7 • *The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications* (SS8: *New Trends in Calculus of Variations and Partial Differential Equations*), Orlando, 2/7 • *9th European Conference on Elliptic and Parabolic Problems*, Gaeta, 24/5 • University of Bristol, 17/3 • *Variational Perspectives*, Politecnico di Torino, 8/3.
- 2015** University of Vienna, 10/9 • *AMS-EMS-SPM Joint International Meeting*, Porto, 11/6 • University of Évora, 3/6 • Ohio University, 8/4 • *Analytic approaches to scaling limits for random system*, HIM, Bonn, 27/1.
- 2014** *CAMGSD Seminar*, Instituto Superior Técnico, 16/12 • ICMS seminar on particle systems, Eindhoven University of Technology, 17/10 • *CASA colloquium*, Eindhoven University of Technology, 15/10 • *The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications* (SS85: *Transport Processes in Biology: Modelling and Analysis*), Madrid, 8/7 • University of Sussex, 19/5 • CNA Seminar, Carnegie Mellon University, 28/1.
- 2013** *BMS Intensive Course on Evolution Equations and their Applications*, TU Berlin, 28/11 • Universidade Nova de Lisboa, 15/5 • *The Eighth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, GA, 27/3.
- 2012** Instituto Superior Técnico, 21/11 • MMC Seminar, Mechanical Engineering, Carnegie Mellon University, 26/10 • University of Modena and Reggio Emilia, 27/9 • University of Parma, 25/9 • *The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications* (SS76: *On PDEs from Biology*), Orlando, 2/7 • CNA Seminar, Carnegie Mellon University, 17/4 • Instituto Superior Técnico, 7/3.
- 2011** McGill University, 28/11 • University of Padua, 19/9.
- 2010** *The 8th AIMS Conference on Dynamical Systems, Differential Equations and Applications* (SS45: *Evolution Equations and Mathematical Biology*), Dresden, 27/5.

## Presentations

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- 2017** *Nonconvexity, Nonlocality and Incompatibility: From Materials to Biology*, University of Pittsburgh, 5/5 • *2017 MRS Spring Meeting and Exhibit*, Phoenix, 18/4 • *16th GAMM-Seminar on Microstructures*, TU Dortmund, 20/1.
- 2016** *7th European Congress of Mathematics*, TU Berlin, 21/7 • *Convegno Scientifico GNAMPA 2016*, Montecatini Terme, 21/6 • *XXVI Convegno Nazionale di Calcolo delle Variazioni*, Levico Terme, 19/1.
- 2015** International Workshop *Calculus of Variations and its Applications*, Universidade Nova de Lisboa, 17/12 • *AMS-EMS-SPM Joint International Meeting*, Porto, 12/6.
- 2014** Spring School on *Microscopic descriptions and mean-field equations in physics and social sciences* (poster), University of Bath, 13/5 • Winter School *Calculus of Variations in Physics and Materials Science* (poster), Würzburg 13/2 • 2014 Joint Mathematics Meeting, Baltimore, 16/1.
- 2012** CMU CNA Working Group, 4/12 • *Evolution problems in damage, plasticity and fracture: mathematical models and numerical analysis*, Udine, 20/9 • *Heterostructured Nanocrystalline Materials* (poster), ICERM, Brown University, 30/5 • Winter School *Calculus of Variations in Physics and Materials Science* (poster), Würzburg, 12/1.
- 2011** *Incompressible Fluids, Turbulence and Mixing*, Carnegie Mellon University, 15/10.
- 2010** *Individual and Collective Fluid Mechanics of Swimming Microorganisms*, Glasgow, 8/7.
- 2009** *International Conference on Elliptic and Parabolic Equations* (poster), WIAS, Berlin, 1/12 • Workshop *Multiscale Analysis of Self-Organization in Biology* (poster), BIRS, Banff, 14/7.

## Teaching activity

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At Politecnico di Torino

**2019–2020** *Analisi matematica 1* for the degree courses in Engineering.

**2018–2019** Lezione per il PLS *Biliardi, sistemi dinamici, frattali* 6/3/2019.

*Analisi matematica 2* (percorso per i giovani talenti) for the degree courses in Engineering.

Recitations for *Analisi matematica 1* for the degree courses in Engineering. (Indice docente: 3.73/4; Tasso di soddisfazione docente: 94.9%).

At the University of Trieste

**2016–2017** *Istituzioni di Matematiche* for the degree course in Architecture.

**2015–2016** *Istituzioni di Matematiche* for the degree course in Architecture • Recitations for the course *Meccanica analitica* for the degree course in Mathematics.

**2014–2015** *Istituzioni di Matematiche* for the degree course in Architecture.

**2009–2010** Tutor for the course of *Matematica I* for the degree course in Chemistry.

At SISSA

**2015–2016** Reading course on Measure and Integration.

At Instituto Superior Técnico

**2014** Recitations for the course Complex Analysis and Differential Equations, Spring semester.

At the University of Pavia

**2006–2007** TA for the course of *Istituzioni di Matematiche* for the degree course in Biological Sciences • Introductory course in Mathematics for the first-year students in Mathematics and Physics, 2006–2007 • Tutor for the course of *Matematica con elementi di statistica* for the degree courses in Pharmacy.

**2005–2006** Introductory course in Mathematics for the first-year students in Mathematics and Physics.

**2004–2005** Tutor for the course of *Istituzioni di Matematiche* for the degree course in Biological Sciences • Introductory course in Mathematics for the first-year students in Natural Sciences and Geology.

## Participation to conferences, congresses, and schools

**forthcoming** *Modeling of Crystalline Interfaces and Thin Film Structures: a Joint Mathematics-Physics Symposium*, ESI Vienna, 11–15/11/2019.

9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, 15–19/7/2019.  
*Calculus of Variations on Schiermonnikoog*, 1–5/7/2019.

**past ten** *International Conference on Elliptic and Parabolic Problems*, Gaeta, 20–24/5/2019 • *Workshop on Calculus of Variations and Applications*, Salerno, 18/5/2019. • *Analysis and applications. Contributions from young researchers*, Politecnico di Torino, 8–9/4/2019 • INI Programme *The mathematical design of new materials*, Cambridge, 17/2–2/3/2019 • *XXIX Convegno Nazionale di Calcolo delle Variazioni*, Levico Terme, 4–8/2/2019 • *AMS-MAA Joint Mathematics Meeting*, Baltimore, 16–19/1/2019 • *Joint PTM-SIMAI-UMI mathematical meeting*, Wrocław, 17–20/9/2018 • *Fifth Workshop on Thin Structures*, Naples, 13–15/9/2018 • *New trends in the variational modeling of failure phenomena*, ESI Vienna, 20–24/8/2018 • *The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Taipei, 5–9/7/2018

## Organizing activity

**forthcoming** Minisymposium *Mathematical Models for Solid Mechanics and Soft Structures* at the 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, 15–19/7/2019 (with L. Lussardi).

**2019** Minisymposium *Advances in Mathematical Analysis stemming from Applications* at the International Conference on Elliptic and Parabolic Problems, Gaeta, 20–24/5 (with E. Zappale). • *Analysis and applications. Contributions from young researchers*, Politecnico di Torino, 8–9/4 (with D. Zucco).

**2018** SS75 *Mathematics and materials: models and applications* at the 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan, 5–9/7 (with M. Barchiesi and T. Hudson) • Oberseminar M15 at TUM, Spring 2018 (with C. E. Améndola Cerón, M. Fornasier, and P. Massopust).

**2016** Mini-Symposium 16 *Dislocations: recent results and perspectives* at the 7<sup>th</sup> European Congress of Mathematics, TU Berlin, 18–22/7 (with I. Lucardesi) • Special Session 27 *Advances in the mathematical modeling of failure phenomena and interfaces in materials* at the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, 1–5/7 (with M. Barchiesi and J. Matias) • *Advances in the Mathematical Analysis of Material Defects in Elastic Solids*, SISSA, Trieste, 6–10/6 (with G. Dal Maso and A. DeSimone) • CalcVar seminar cycle at SISSA, Trieste, Fall 2015–Spring 2016.

**2015** *Trends in Non-Linear Analysis 2015*, SISSA, Trieste, 1–3/7 (with J. Matias) • Special Session *Mathematical models for materials* at the AMS-EMS-SPM Joint International Meeting, Porto, 10–13/6 (with G. Hayrapetyan and J. Matias) • Intensive Trimester *Variational Models for Plasticity and Dislocations*, SISSA, Trieste, 23/2–15/5 (with G. Dal Maso).

**2014** *Trends in Non-Linear Analysis*, Instituto Superior Técnico, Lisbon, 31/7–1/8 (with J. Matias).

**2012** CNA-PIRE Working Group *Variational methods for phase transitions and copolymers* at Carnegie Mellon University, Spring semester (with T. Blass, M. Goldman, G. Hayrapetyan, and B. Zwicknagl).

**2007** Conference *La matematica fra i modelli e la realtà* at Collegio Ghislieri, Pavia, 14/5. Speaker: Alfio Quarteroni (Politecnico of Milan and Ecole Polytechnique Fédérale of Lausanne) • Conference *Matematica e Scienze sociali* at Collegio Ghislieri, Pavia, 9/5. Speaker: Stefano Demichelis (University of Pavia).

## Refereeing service

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I serve (or have served) as a referee for the following journals:

Applied Wave Mathematics • Communications in Pure and Applied Analysis • International Journal of Applied Mathematics and Computer Science • Journal of Nonlinear Science • Nonlinear Analysis • Physica D • Rendiconti del Seminario Matematico. Università e Politecnico di Torino • SIAM Journal on Mathematical Analysis • SMAI Journal of Computational Mathematics • Transactions of Mathematics and Its Applications • Wave Motion