

# MARIN MIŠUR, PH.D.

EMAIL: mmisur@math.hr, pfobos@gmail.com

WEBPAGE: <http://web.math.pmf.unizg.hr/~mmisur/>

## Personal Details

Date and place of birth: December 18th, 1988, Split, Croatia

Citizenship: Croatian

---

## Education

10/2012–06/2017: PhD student of mathematics at University of Zagreb

I defended my thesis *H-distributions and compactness by compensation* on 2nd of June 2017 under supervision of prof. Nenad Antonić. The thesis defence committee: prof. Marko Vrdoljak (chairman, Zagreb), prof. Nenad Antonić (Zagreb), prof. Eugeny Yu. Panov (Novgorod, Russia).

10/2010–07/2012: Master degree of Applied mathematics at the University of Zagreb;

I graduated *summa cum laude* 11th of July 2012 with master thesis *Compensated compactness* under supervision of prof. Nenad Antonić; GPA: 4.92 out of 5.00

10/2007–10/2010: B.Sc. in Mathematics at the University of Zagreb; GPA: 5.00 out of 5.00

---

## Online courses

Machine learning, Heterogeneous parallel programming, Optimization for Intel architecture

---

## Work and research details and experience

CURRENT POSITION (from 01/2015 until 03/2018): Teaching and research assistant at Univeristy of Zagreb;

ADDRESS: Department of Mathematics, Bijenička cesta 30, 10000 Zagreb, Croatia

My teaching duties included holding weakly excercise sessions, and grading the exams.

My research duties included performing PhD research, helping advisor with the scientific project reports and proposals, and local organisation of workshops.

General areas of my PhD research were partial differential equations and calculus of variations (particularly, parametrised measures and compactness by compensation theory). My PhD thesis was on novel tools for analysis of nonlinear partial differential equations

I am also interested in parallel computing and applications of parallel computing on GPUs.

2012–2014: Teaching assistant (honorary work) at Faculty of Science of Univeristy of Zagreb;

---

## Skills and competencies

### LANGUAGES

Croatian: native; English: fluent; German: basics (4 years in gymnasium); French: basics (2 years in foreign language school)

### COMPUTER SKILLS

programming languages: C, C++, Matlab

knowledge of CUDA C, MPI, OpenACC

BLAS and Lapack; deal.ii (fundamentals), FreeFem++, LaTeX, TeX

basic and intermediate Linux System Administration (4 courses each lasting 25 hours at University Computing Centre of University of Zagreb)

In January 2013. I successfully finished online Coursera offering of the class *Heterogeneous Parallel Programming* of professor Wen-mei W. Hwu and received Statement of accomplishment with distinction.

In January 2014. and 2015. I served as a community TA for the Coursera offerings of the same class.

In October 2015. I finished a web based training programme with hands-on component *Parallel Programming and Optimization for Intel Architecture* of Colfax International (20 hours; level of accomplishment: fundamental).

---

## Scientific work

- M. Mišur, D. Mitrović: *On a Generalization of Compensated Compactness in the  $L^p$ - $L^q$  setting*, *Journal of Functional Analysis* **268** (2015) 1904–1927.
- M. Mišur, D. Mitrović, A. Novak: *On the Dirichlet-Neumann Boundary Problem for Scalar Conservation Laws*, *Mathematical Modelling and Analysis* **21** (2016) 685–698.
- M. Mišur, D. Mitrović: *On compactness of commutator of multiplication and pseudodifferential operator*, accepted in *Journal of Pseudo-Differential Operators and Applications*, DOI: 10.1007/s11868-018-0239-y
- M. Mišur: *On Peetre's theorem*, (submitted), 8pages
- N. Antonić, M. Mišur, D. Mitrović: *On The First Commutation Lemma*, (submitted) 18pages
- M. Mišur: *On the mixed boundary value problem for semilinear elliptic equations*, (submitted), 17pages
- N. Antonić, M. Erceg, M. Mišur: *Distributions of anisotropic order and applications*, (in preparation), 23pages
- M. Erceg, M. Mišur, D. Mitrović: *Velocity averaging and strong precompactness for degenerate parabolic equations with discontinuous flux*, (in preparation), 26pages
- M. Mišur, D. Mitrović: *Hörmander-Mihlin theorem with fractional derivatives conditions*, (in preparation), 7pages
- M. Mišur, Lj. Palle: *A note on the order of distributions*, (in preparation), 21pages

---

## Conferences

During my master and PhD studies I attended 13 scientific conferences (I gave 8 talks and had 2 poster presentation).

- September 2012: *Topics in PDE, Microlocal and Time-frequency Analysis*, Novi Sad, Serbia
  - June 2013: *ApplMath13 - 8th Conference on Applied Mathematics and Scientific Computing*, Šibenik, Croatia, where I gave a talk *On a generalization of compactness by compensation in the  $L^p$ - $L^q$  setting*
  - May 2014: *PDEs, Continuum Mechanics and Numerical Analysis*, Dubrovnik, Croatia, where I gave a talk *On  $H$ -distributions*
  - July 2014: *Days of Analysis in Novi Sad*, Novi Sad, Serbia, where I had a poster presentation *Generalised compactness by compensation*
  - December 2015: *Semiclassical Analysis and Non-self-adjoint Operators*, CIRM Marseille, France
  - August 2016: *Hyp2016 - XVI International Conference on Hyperbolic Problems. Theory, Numerics, Applications*, Aachen, Germany, where I gave a talk *On the Dirichlet-Neumann boundary problem for scalar conservation laws*
  - September 2016: *GF2016 - International conference on generalised functions*, Dubrovnik, Croatia, where I gave a talk  *$H$ -distributions, distributions of anisotropic order and Schwartz kernel theorem*
  - September 2016: *VII International Conference Optimization and Applications*, Petrovac, Montenegro, where I gave a talk *On a gradient constraint problem for scalar conservation laws*
  - October 2016: *CDV2016 - Lecce Conference in Calculus of Variations and Partial Differential Equations*, Lecce, Italy
  - October 2016: *International Conference Applications of Generalized Functions in General Relativity, Stochastics and Mechanics*, Novi Sad, Serbia, where I gave a talk *On  $L^p$  compactness of commutator of multiplication and Fourier multiplier operator*
  - February 2017: *Generalised functions, microlocal analysis, PDEs and dynamical systems – Conference in memory of Todor V. Gramchev*, Torino, Italy, where I gave a talk *Extension of Cordes' and Tartar's results on compactness of commutators*
  - July 2017: *Aspects of Time-Frequency Analysis*, Torino, Italy, where I gave a poster presentation *Applications of a version of the Schwartz kernel theorem for anisotropic distributions*
  - August 2017: *11th ISAAC Congress*, Växjö, Sweden, where I gave a talk *Anisotropic distributions and applications*
-

### Study visits and internships

- Université Paris-Sud XI (Paris) - 2 study visits (2017; host: prof. Laurent Moonens)
- SISSA - Scuola Internazionale Superiore di Studi Avanzati (Trieste) - 1 study visit (2017; host: prof. Alessandro Michelangeli)
- BCAM - Basque Center for Applied Mathematics (Bilbao) - 1 study visit and 1 internship (2013; host: prof. Enrique Zuazua)
- University of Dubrovnik (Dubrovnik) - 1 study visit (2011; host: prof. Martin Lazar)
- University of Montenegro (Podgorica) - 4 study visits (2012, 2013, 2014, 2016; host: prof. Darko Mitrović)

In the period 29/10/2017 - 23/12/2017 I visited Université Paris-Sud XI (Paris) (host: prof. Laurent Moonens).

---

### Invited seminars

- Université François-Rabelais (Tours): *Adaptive micro-local defect functionals with application on degenerate equations*, December 14th 2017
- Université Paris-Sud XI (Orsay): *Spaces of distributions of non-integer order and applications*, December 12th 2017
- Université Paris-Sud XI (Orsay): *Anisotropic distributions and compactness by compensation*, June 13th 2017
- SISSA - Scuola Internazionale Superiore di Studi Avanzati: *Anisotropic distributions, microlocal defect functionals, and applications*, May 18th 2017
- BCAM - Basque Center for Applied Mathematics: *On a generalisation of compactness by compensation in the  $L^p - L^q$  setting*, October 11th 2013
- University of Montenegro: *Compensated compactness and parabolic equations*, November 5th 2012

---

### Summer schools and workshops with presentations

During my master and PhD studies, I attended 5 intensive courses and 21 summer schools and workshops (I gave 4 talks and 8 poster presentations).

- Applications of Calculus of Variations and Optimal Control. Smooth and Nonsmooth Cases (Struga, Macedonia, 2011)
- Scuola Matematica Interuniversitaria (Perugia, Italy, 2011)
- Intensive course and workshop on Gabor Frames and Wavelets in Local Analysis (Novi Sad, Serbia, 2011)
- Intensive course on Industrial Mathematics (Sofia, Bulgaria, 2011)
- Intensive course on Data Protection (Pomorie, Bulgaria, 2012)
- *Trends in Nonlinear Elliptic and Parabolic Equations* (SMI Cortona, Italy, 2012), where I gave a talk *A Strong Maximum Principle for Some Semilinear Elliptic Equations*
- School and workshop on *Geometric Measure Theory and Optimal Transport* (ICTP Trieste, Italy, 2013)
- Intensive course on Microlocal Analysis, Wave Fronts and Propagation of Singularities (Novi Sad, Serbia, 2013)
- The Second BCAM Workshop on *Computational Mathematics*, Basque Center for Applied Mathematics (Bilbao, Basque country 2013)
- Winter School on *Calculus of Variations in Physics and Materials Science* (Würzburg, Germany, 2014), where I gave a poster presentation *An application of compactness by compensation on nonlinear parabolic type equation*
- Winter School NUMAP-FOAM - *Numerical Modelling of Coupled Problems in Applied Physics with Open-FOAM* (Zagreb, Croatia, 2014)
- ViennaPDE Workshop on *Advances in Nonlinear PDEs: Analysis, Numerics, Stochastics, Applications* (Wien, Austria, 2014), where I gave a poster presentation *Recent Results on H-distributions*

- Gene Golub SIAM Summer School 2014: *Simulation, Optimization, and Identification in Solid Mechanics* (RICAM Linz, Austria, 2014), where I gave a poster presentation *Compactness by compensation and nonlinear parabolic type equation*
- PIRE Workshop: *Atomistic and MultiScale Models of Materials* (Warwick, United Kingdom, 2014), where I gave a poster presentation *Compactness by compensation via H-distributions*
- Workshop on *Shape and topological optimization* (RICAM Linz, Austria, 2014), where I gave a poster presentation *Generalisation of compactness by compensation*
- School on *Optimal Transport in the Applied Sciences* (RICAM Linz, Austria, 2014)
- CIMPA–MIMS School and Workshop on *Nonlinear Partial Differential Equations arising from Geometry and Physics* (Hammamet, Tunis, 2015)
- Workshop on *Trends in Non-Linear Analysis* (SISSA Trieste, Italy, 2015)
- School on *Transport, Fluids and Mixing* (Levico Terme, Italy, 2015), where I gave a poster presentation *Microlocal defect functionals and application*
- School *Autumn School in Nonlinear Science* (Lisbon, Portugal, 2015), where I gave a poster presentation *On a mixed boundary problem for scalar conservation laws*
- School and Workshop *PDEs and Applications* (Napoli, Italy, 2016), where I gave a talk *Compensated compactness in the  $L^p - L^q$  setting*
- International Workshop on PDEs: analysis and modelling (Zagreb, Croatia, 2016), where I gave a talk  *$L^p$  version of the First commutation lemma*
- Workshop *Geometric Measure Theory: Analysis and non-smooth objects* (Toulouse, France, 2016), where I gave a talk *H-distributions and compensated compactness*
- Workshop *Geometric Measure Theory, Shape Optimisation, and Free Boundaries* (SISSA Trieste, Italy 2016)
- Workshop *Modern challenges in continuum mechanics* (Zagreb, Croatia, 2017), where I gave a poster presentation *Some new applications of microlocal defect functionals*
- Workshop *Recent Advances in PDEs and the Calculus of Variations* (Venezia, Italy 2017)

---

### Memberships

American Mathematical Society  
 Society for Industrial and Applied Mathematics  
 International Association for Generalized Functions  
 Amnesty International

---

## PhD classes

- Real and functional analysis (grade A)
- Partial differential equations (grade A)
- Convex and nonsmooth analysis (grade A)
- Vector spaces and matrix algorithms (grade A)
- Selected topics of numerical linear algebra (grade A)
- Microlocal defect functionals (grade A)
- Homogenization theory and applications in optimal design (audited)
- Contemporary topics in conservation laws and evolution equations (audited)
- Convex integration and nonregular solutions of partial differential equations (audited)

## Bachelor programme classes

- Elementary mathematics 1& 2
- Mathematical analysis 1& 2
- Linear algebra 1& 2
- Physics 1& 2
- Computer programming 1& 2
- Data structures and algorithms
- Computer networks
- Computing lab 1
- Numerical mathematics
- Differential calculus of functions of several variables
- Integral calculus of functions of several variables
- Discrete mathematics
- Number theory
- Statistics
- Probability
- Markov chains
- Ordinary differential equations
- Methods of mathematical physics
- Measure and integration
- Vector spaces
- Complex analysis
- Algebraic structures
- Set theory

## Master programme classes

- Partial differential equations 1& 2
- Numerical analysis 1& 2
- Scientific computing 1& 2
- Numerical solution of partial differential equations 1& 2
- Calculus of variations with applications
- Theory of elasticity
- Fluid mechanics
- Introduction to parallel computing
- Applications of parallel computing
- Introduction to semigroup theory
- Parabolic equations
- Mathematical modeling of transport
- Introduction to optimization
- Metric spaces
- Normed spaces
- Operators on normed spaces
- Differential geometry 1& 2
- Computability