

# Martin MICHÁLEK

## PERSONAL DATA

---

PLACE AND DATE OF BIRTH: Hradec Králové, Czech Republic | August 26, 1988  
ADDRESS: Davídkova 1190/92, 18200, Prague, Czech Republic  
PHONE: +420 602 169 058  
EMAIL: [michalek@math.math.cas.cz](mailto:michalek@math.math.cas.cz)

## CURRENT POSITIONS

---

FROM 9/2013 | Ph.D. student, **Faculty of Mathematics and Physics, Charles University**,  
FROM 9/2013 | Junior research position **Institute of Mathematics of the Czech Academy of Sciences**, Prague.

## EDUCATION

---

TO DATE | Doctoral studies in **MATHEMATICAL ANALYSIS, Faculty of Mathematics and Physics, Charles University**, Prague  
Major: Partial differential equations  
Thesis: “Mathematical analysis of fluids in motion” | Advisor: Eduard Feireisl  
Defence of the thesis: 13 June 2017

10/2013 | Master degree in **PURE MATHEMATICS, Faculty of Mathematics and Physics, Charles University**, Prague  
*summa cum laude* | Major: Mathematical analysis of partial differential equations  
Thesis: “Dissipative partial differential equations in unbounded domains.” | Advisor: Dalibor Pražák

6/2011 | Bachelor degree in **PURE MATHEMATICS, Faculty of Mathematics and Physics, Charles University**, Prague  
*summa cum laude* | Major: Fourier Analysis

6/2008 | **Gymnázium J. K. Tyla**, Hradec Králové | Final Grade: 100/100

## SCIENTIFIC VISITS AND INTERNSHIPS

---

10/2014 | Université du Sud – Toulon-Var, France  
*Cooperation on topics in fluid mechanics with prof. A. Novotný and D. Maltese*  
October 14–23, 2014

3–5/2015 | University of Sevilla and BCAM Bilbao, Spain  
*Doc Course of Applied Mathematics*  
Research project (under supervision of prof. Francisco Guillén): **Mathematical and numerical analysis of the modified Caginalp model for melting and solidification.**  
March 1 - May 30, 2015

7/2016	Ècole polytechnique fédérale de Lausanne, Switzerland <i>Cooperation with E. Chiodaroli: oscillatory solutions of equations used in oceanology</i> July 18–22, 2016
10–11/2016	Technion – Israel Institute of Technology, Haifa, Israel <i>Cooperation with A. Novick-Cohen (Cahn–Hilliard–Navier–Stokes equations)</i> October 24 - November 4 2016
12/2016 –3/2017	Université du Sud - Toulon - Var, France WCMCS internship for Ph.D. students for the Simons semester Cross-Fields PDEs <i>International Mathematical Institute of Stefan Banach, Warsaw, Poland</i> December 1, 2016 – March 30, 2017

---

## LIST OF ACCEPTED OR PUBLISHED ARTICLES

---

- 2015 | M. Michálek. STABILITY RESULT FOR NAVIER-STOKES EQUATIONS WITH ENTROPY TRANSPORT. *Journal of Mathematical Fluid Mechanics*, 17, no. 2, 279–285 (2015).
- 2015 | E. Feireisl, T. Karper, M. Michálek. CONVERGENCE OF A NUMERICAL METHOD FOR THE COMPRESSIBLE NAVIER-STOKES SYSTEM ON GENERAL DOMAINS. *Numerische Mathematik*, Volume 134, Issue 4, 667–704 (2016).
- 2016 | E. Feireisl, R. Hošek, M. Michálek. A CONVERGENT NUMERICAL METHOD FOR THE FULL NAVIER-STOKES-FOURIER SYSTEM IN SMOOTH PHYSICAL DOMAINS. *SIAM J. Num. Math.*, 54(5), 3062–3082 (2016).
- 2016 | D. Maltese and M. Michálek and P. B. Mucha and A. Novotný and M. Pokorný and E. Zatorska. EXISTENCE OF WEAK SOLUTIONS FOR COMPRESSIBLE NAVIER–STOKES EQUATIONS WITH ENTROPY TRANSPORT. *Journal of Differential Equations*, Volume 261, Issue 8, 4448–4485 (2016).
- 2016 | M. Michálek, D. Pražák and J. Slavík. SEMILINEAR DAMPED WAVE EQUATION IN LOCALLY UNIFORM SPACES. *Accepted in Communications on Pure and Applied Analysis*.
- 2017 | E. Chiodaroli, M. Michálek. EXISTENCE AND NON-UNIQUENESS OF GLOBAL WEAK SOLUTIONS TO INVISCID PRIMITIVE AND BOUSSINESQ EQUATIONS. *Accepted in Communications in Mathematical Physics*.

---

## SCIENTIFIC INTEREST

---

Mathematical analysis for evolutionary partial differential equations with specialization on mathematical models from *compressible fluid dynamics*.

- existence of solutions using various methods - *energy methods* and *convex integration* (see Michálek: *J. Math. Fluid Mech.* (2015), Maltese et al.: *J. Diff. Eq.* (2016), Chiodaroli and Michálek: *Comm. Math. Phys.* (2017))
- convergence of numerical schemes, (see Feireisl et al. *Num. Math.* (2016), Feireisl et al.

*SIAM J. Numer. Anal.* (2016)

- asymptotic behaviour (see Michálek et al.: *Commun. Pur. Appl. Anal.* (2016)),
- qualitative properties of solutions.

Classes of equations - Navier-Stokes equations (incompressible and compressible) and their viscid limits (Euler equations). Accordant mathematical tools - functional and harmonic analysis, nonlinear geometry, etc.

## SCHOLARSHIPS

---

Scholarship for the students with an outstanding studying results (Faculty of Mathematics and Physics Charles University) - 2009, 2010, 2011, 2012.

## PARTICIPATION ON GRANTS

---

9/2013–4/2016 | Grant no. GA13-00522S of the Czech Grant Agency

5–12/2016 | ERC - grant MATHEF(320078)

1–3/2017 | Simons - Foundation grant 346300 and the Polish Government  
MNiSW 2015-2019 matching fund

4/2016–TO DATE | ERC - grant MATHEF(320078)

## CONFERENCES, SEMINARS AND WORKSHOPS WITH MY CONTRIBUTION

---

6/2014 | Conference: THE WEEK OF DOCTORAL STUDENTS  
Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic.  
Short talk: **Compressible Navier Stokes Equations.**

6/2014 | Conference: MODELING, ANALYSIS AND COMPUTING IN NONLINEAR PDES  
Chateaux Liblice, Liblice, Czech Republic (September 21–26, 2014).  
Short talk: **Compressible Navier-Stokes equations with transport of entropy.**

5/2015 | Workshop: BCAM WORKSHOP ON MATHEMATICS AND ITS APPLICATIONS  
Basque Center for Applied Mathematics, Bilbao, Spain (May 27–29, 2015).  
Short talk: **Phase field modelling of melting and solidification.**

6/2015 | Workshop: YOUNG RESEARCHERS IN FLUID DYNAMICS  
TU Darmstadt, Darmstadt, Germany (June 17–19, 2015).  
Short talk: **Compressible flows, mathematical and numerical analysis.**

5/2016 | Workshop: 2ND WORKSHOP ON CENTRAL TRENDS IN ANALYSIS AND NUMERICS FOR PDES  
Charles University, Prague, Czech Republic (May 26–28, 2016).  
Short talk: **Primitive equations and oscillatory solutions**

- 9/2016 | THE FIRST CHINA-CZECH CONFERENCE ON MATHEMATICAL FLUID MECHANICS  
Beijing, China (September 26–30, 2016).  
Invited talk: **Existence of global weak solutions for inviscid PDE models in oceanography.**
- 10/2016 | Seminar: PDE AND APPLIED MATHEMATICS  
Technion - Israel Institute of Technology, Haifa, Israel (October 25, 2016).  
Given lecture: **Existence of global weak solutions for inviscid PDE models in oceanography.**
- 1/2017 | Conference: MATHFLOWS 2017  
Bedlewo, Poland (January 16–20, 2017).  
Short talk: **Existence of global weak solutions for inviscid primitive equations.**
- 1/2017 | Seminar: MATHEMATICAL PHYSICS EQUATIONS  
Faculty of Mathematics and Information Science, University of Warsaw, Warsaw, Poland (January 26, 2017).  
Given lecture: **Weak solutions to the compressible Navier Stokes.**
- 2/2017 | Workshop: IDEAL FLUIDS AND TRANSPORT  
Banach Center, Warsaw, Poland (February 13–15, 2017).  
Presented poster: **Inviscid primitive equations and weak solutions**
- 3/2017 | Seminar: SIMONS SEMESTER “MATHFLOWS” SEMINAR  
Banach Center, Warsaw, Poland (March 13, 2017).  
Given lecture: **Some sufficient conditions for energy/entropy conservation in general balance laws.**

## CONFERENCES AND WORKSHOPS - ORGANIZATION

---

- 1/2016 | Conference: THE FIRST MEETING OF PH.D. STUDENTS OF MATHEMATICAL ANALYSIS AND DIFFERENTIAL EQUATIONS  
Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic, (January 25–28 2016).
- 2/2017 | Workshop: IDEAL FLUIDS AND TRANSPORT  
Banach Center, Warsaw, Poland, (February 13–15, 2017).

## CONFERENCES, WORKSHOPS AND SCHOOLS - PARTICIPATION

---

- 5/2013 | THE 13TH SCHOOL IN MATHEMATICAL THEORY IN FLUID MECHANICS  
Kácov, Czech Republic.
- 10/2013 | Workshop: MODELLING REVISITED + MODEL REDUCTION  
Chateau Liblice, Liblice, Czech Republic.
- 5/2014 | Workshop: REGULARITY THEORY FOR ELLIPTIC AND PARABOLIC SYSTEMS AND PROBLEMS IN CONTINUUM MECHANICS  
Telč, Czech Republic.

6/2014	SCHOOL ON NONLINEAR ANALYSIS AND FUNCTION SPACES Třešť, Czech Republic.
11/2014	OBERWOLFACH SEMINAR: ANALYSIS OF COMPRESSIBLE NAVIER STOKES EQUATIONS AND RELATED TOPICS Mathematisches Forschungsinstitut Oberwolfach, Germany.
6–7/2015	Seminars: MATHEMATICAL THERMODYNAMICS OF COMPLEX FLUIDS Centro Internazionale Matematico Estivo, Cetraro, Italy.
2/2016	ERC WORKSHOP: MODELING MATERIALS AND FLUIDS USING VARIATIONAL METHODS Weierstrass Institute for Applied Analysis, Berlin, Germany.
5/2016	REGULARITY THEORY FOR ELLIPTIC AND PARABOLIC SYSTEMS AND PROBLEMS IN CONTINUUM MECHANICS Telč, Czech Republic.
6/2016	Workshop: ENTROPY METHODS, DISSIPATIVE SYSTEMS, AND APPLICATIONS Schrödinger Institute, Wien, Austria.
7/2016	Summer school on Evolution Equations EVEQ 2016 Prague, Czech Republic.
12/2016	WINTER SCHOOL CROSSFIELDS PDES Bedlewo Conference Center, Poland
3/2017	Workshop: NONSTANDARD GROWTH ANALYSIS AND ITS APPLICATIONS Banach Center, Warsaw, Poland .
3/2017	Workshop: WORKSHOP CURRENT TOPICS IN KINETIC THEORY Banach Center, Warsaw, Poland.

## LANGUAGES

---

CZECH: Mother tongue  
 ENGLISH: Fluent  
 GERMAN: Working Knowledge  
 FRENCH: Basic Knowledge

## COMPUTER SKILLS

---

Advanced Knowledge: PYTHON, L<sup>A</sup>T<sub>E</sub>X  
 Intermediate Knowledge: C#, VBA, FENICS, PHP, HTML,  
 Basic Knowledge: MATLAB, MySQL.