

Florian Oschmann

Curriculum Vitae

Personal data

First name Florian
Family name Oschmann
Date of birth 19.03.1995
Place of birth Friedrichroda, Germany
Nationality German
Email oschmann@math.cas.cz
Homepage <https://florian-oschmann.github.io/>

Recent employment

since 07/2022 **Postdoctoral fellow**, *Akademie Věd České Republiky, Praha*
Department of Evolutionary Differential Equations; Head of group: Šárka Nečasová

Education

2018–2022 **Ph.D. in Mathematics**, *TU Dortmund*, Dortmund
Title of PhD thesis: Homogenization of compressible fluids in perforated domains;
Supervisor: Prof. Dr. Peter Bella, *Final grade: magna cum laude (very good)*
2017–2019 **B.Sc. in Physics**, *Universität Leipzig*, Leipzig, *Final grade: 1.6*
2013–2018 **Graduate Mathematician (Diplom-Mathematiker)**, *Universität Leipzig*, Leipzig, *Final grade: 1.2*
Title of Diploma thesis: Über die Joukowski-Abbildung und ihre Anwendungen in der Aerostatik (On the Joukowski mapping and its applications in aerostatics);
Supervisor: Prof. Dr. Hans-Peter Gittel
2005–2013 **High School Diploma (Abitur)**, *Perthes-Gymnasium*, Friedrichroda, Germany, *Final grade: 1.1*

Employment history

2019–2022 **Ph.D. student**, *TU Dortmund*, Dortmund
2018–2019 **Ph.D. student**, *Universität Leipzig*, Leipzig

Teaching Experience

Summer 2025 **Tutor of exercise classes for Bachelor students**, *Karlova Univerzita, Praha*
Mathematical Analysis 1 (in English)
Summer 2022 **Tutor of exercise classes for Bachelor students**, *TU Dortmund*
Analysis II

- Winter 2021/22 **Consultant in Masterseminar**, *Homogenization of compressible Navier–Stokes–Fourier equations*, TU Dortmund
Supervisor: Prof. Dr. Peter Bella
- 2020–2022 **Tutor and organization of exercise classes for Analysis I–III**, TU Dortmund
Lecturer: Prof. Dr. Peter Bella
- 2019–2020 **Tutor of exercise classes for Bachelor students**, TU Dortmund
 Analysis II (Summer 2020)
 Analysis I (Winter 2019/2020)
- 2016–2019 **Tutor of exercise classes for Diploma and Bachelor students**, Universität Leipzig
 Mathematik 4 für Physiker (in English) (Summer 2019)
 Mathematik 3 für Physiker (in English) (Winter 2018/2019)
 Gewöhnliche Differentialgleichungen LA Gymnasien (Summer 2018)
 Analysis für Lehramt Grund- und Oberschule (Winter 2017/2018)
 Mathematik für Wirtschaftswissenschaftler 2 (Summer 2017)
 Gewöhnliche Differentialgleichungen (Winter 2016/2017)

Languages

- German native
 English fluently
 Czech intermediate (B1 level)

Grants

- 2023–2025 **Czech Academy of Sciences**, Programme to support prospective human resources - project L100192351 “Compressible fluids: asymptotic behavior, fluids with structure, related problems”, main investigator
- 2022–2024 **Czech Science Foundation**, project GA22-01591S “Mathematical theory and numerical analysis for equations of viscous newtonian compressible fluids”, team member (main investigator: Šárka Nečasová)

Research activities

Organizing committee

- 07.04.–11.04.2025 **GAMM25**, *Poznań, Poland*, co-organizer of Minisymposium “Mathematical analysis of interacting particles”, together with Iulia Cristian
- 20.08.–25.08.2023 **ICIAM23**, *Tokyo, Japan*, co-organizer of Minisymposium “Limit behavior and asymptotic properties in fluid mechanics”, together with Thomas Eiter

Participation in workshops and conferences

- 29.09.–01.10.2025 “Mathematical Analysis of Fluid Flows by Variational Methods” (Berlin, Germany)
- 14.09.–17.09.2025 “Hydrodynamic models and multi-scale analysis in PDEs” (Warszawa, Poland)
- 25.08.–29.08.2025 Summer School “Rotation and Fluids” (Praha, Czech republic)
- 23.06.–24.06.2025 Workshop (Warszawa, Poland)
- 02.06.–06.06.2025 Mathematics with Applications 2025, on the occasion of the 60th Birthday of Professor Šárka Nečasová (Funchal, Portugal)

- 07.04.–11.04.2025 GAMM25 (Poznań, Poland; co-organizer of Minisymposium “Mathematical analysis of interacting particles”)
- 13.01.–17.01.2025 Third Chinese-Czech Conference on Mathematical Fluid Mechanics (Xi’an, China)
- 08.01.–10.01.2025 Fluids @PoliMi (Milano, Italy)
- 19.08.–23.08.2024 Mathematical Fluid Mechanics In 2024 (Praha, Czech republic)
- 17.06.–21.06.2024 EVEQ 2024, NextGen (Praha, Czech republic)
- 12.05.–17.05.2024 EMS School “Mathematical Aspects of Fluid Flows” (Kácov, Czech republic)
- 19.03.–22.03.2024 Multi-scale methods for reactive flow and transport in complex elastic media; Conference in memory of prof. Andro Mikelić (Dubrovnik, Croatia)
- 11.12.–13.12.2023 RIMS Workshop on Mathematical Analysis of Viscous Incompressible Fluid (Kyoto, Japan)
- 07.12.–08.12.2023 Recent Topics on the Mathematical Fluid Mechanics (Tokyo, Japan)
- 20.08.–25.08.2023 ICIAM23 (Tokyo, Japan; co-organizer of Minisymposium “Limit behavior and asymptotic properties in fluid mechanics”)
- 26.06.–30.06.2023 Shocking Developments: New Directions in Compressible and Incompressible Flows: A Conference in Honor of Alexis Vasseur’s 50th Birthday (Leipzig, Germany)
- 12.06.–16.06.2023 Biomedical Fluid Mechanics (Praha, Czech republic)
- 30.05.–02.06.2023 GAMM23 (Dresden, Germany)
- 18.10.–22.10.2022 Against the flow (Będlewo, Poland)
- 22.08.–26.08.2022 Mathematical Fluid Mechanics In 2022 (Praha, Czech republic)
- 11.07.–15.07.2022 Equadiff 15 (Brno, Czech republic)
- 23.08.–27.08.2021 Summer School “Fluids under Control” (Praha, Czech republic; online)
- 22.02.–26.02.2021 Winterschool on Analysis and Applied Mathematics (Münster, Germany; online)
- 15.02.–19.02.2021 Multi-scale Analysis: Thematic Lectures and Meeting (Bengaluru, India; online)
- 2020–2022 One World PDE Seminar (Bath, UK; online)
- 17.06.–21.06.2019 Progress in Mathematical Fluid Dynamics (Cetraro, Italy)
- 10.06.–14.06.2019 International Conference on Fluids and Variational Methods (Budapest, Hungary)
- 03.06.–06.06.2019 Material theories, statistical mechanics, and geometric analysis: A conference in honor of Stephan Luckhaus’ 66th birthday (Leipzig, Germany)

Invited talks

- 09.2025 **Per aquam ad astra: On stars (and) boiling water**, *Hydrodynamic models and multi-scale analysis in PDEs*, University of Warszawa, Warszawa
- 23.06.2025 **Fall in Summer: Does a rigid body touch the ground?**, *Workshop*, University of Warszawa, Warszawa
- 13.12.2024 **Introduction to homogenization for Navier-Stokes equations**, *Seminar “Funktionenräume”*, Friedrich-Schiller-Universität, Jena
- 05.09.2024 **Overview on homogenization for Navier-Stokes equations**, Nanjing University, Nanjing
- 27.11.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, Polish Academy of Sciences, Warszawa
- 24.04.2023 **Singular limits for stratified fluids**, Polish Academy of Sciences, Warszawa

- 31.01.2023 **Stratified fluids: On pancakes and non-local temperatures**, University of Hradec Králové, Hradec Králové
- 18.01.2023 **Stratified fluids: On pancakes and non-local temperatures**, *Langenbach-Seminar*, WIAS Berlin, Berlin
- 09.11.2022 **An unexpected term for the Oberbeck–Boussinesq approximation**, *Séminaire EDP*, Université Paris Cité, Paris

Scientific talks

- 09.2025 Γ -convergence for some nearly incompressible fluids, *MAFF 2025*, WIAS Berlin, Berlin
- 03.06.2025 **Darcy’s law for inhomogeneous incompressible flows**, *Mathematics with Applications 2025*, University of Madeira, Funchal
- 08.04.2025 **Darcy’s law for inhomogeneous incompressible flows**, *GAMM25*, Poznań University of Technology, Poznań
- 21.01.2025 **Quantitative derivation of Darcy’s law for fluids of Carreau-Yasuda type**, Hefei University of Technology, Hefei
- 14.01.2025 **Quantitative derivation of Darcy’s law for fluids of Carreau-Yasuda type**, *Third Chinese-Czech Conference on Mathematical Fluid Mechanics*, Xi’an Jiaotong University, Xi’an
- 22.08.2024 **Quantitative derivation of Darcy’s law for fluids of Carreau-Yasuda type**, *MFIM-IN 2024*, Czech Academy of Sciences, Praha
- 18.06.2024 **Oberbeck-Boussinesq and the boundary issue**, *EVEQ 2024, NextGen*, Czech Academy of Sciences, Praha
- 13.05.2024 **Collision of rigid bodies in a non-Newtonian fluid**, *EMS School “Mathematical Aspects of Fluid Flows”*, Kácov
- 21.03.2024 Γ -convergence for nearly incompressible fluids, *Multi-scale methods for reactive flow and transport in complex elastic media; Conference in memory of prof. Andro Mikelić*, Centre for Advanced Academic Studies, Dubrovnik
- 15.03.2024 **Rigorous derivation of magneto-Boussinesq approximation with non-local term**, Polish Academy of Sciences, Warszawa
- 09.12.2023 **Homogenization and singular limits for compressible fluids**, Waseda University, Tokyo
- 23.08.2023 Γ -convergence for nearly incompressible fluids, *ICIAM23*, Minisymposium “Limit behavior and asymptotic properties in fluid mechanics”, Tokyo
- 12.06.2023 **On (no) collision of a falling solid in a compressible fluid**, *Biomedical Fluid Mechanics*, Czech Academy of Sciences, Praha
- 30.05.2023 Γ -convergence for nearly incompressible fluids, *GAMM23*, Young Researcher’s Minisymposium “Emergent behaviour in systems of hydrodynamically interacting particles”, Dresden
- 02.05.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha
- 13.03.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, *Nečas Seminar on Continuum Mechanics*, Charles University, Praha

- 19.10.2022 **Results on (no) collision of a falling solid in a compressible fluid**, *Against the flow*, Polish Academy of Sciences / Będlewo conference center, Będlewo
- 04.10.2022 **An unexpected term for the Oberbeck–Boussinesq approximation**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha
- 25.08.2022 **Homogenization of compressible fluids in porous media**, *MFM-IN 2022*, Czech Academy of Sciences, Praha
- 11.07.–15.07.2022 **Homogenization of compressible NSE in randomly punctured domains**, *Equadiff 15*, Masaryk university, Brno
Poster
- 08.09.2021 **Inverse of divergence and homogenization of compressible Navier-Stokes equations in randomly perforated domains**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha

Research visits

- 01.09.–13.09.2024 **Nanjing University, Nanjing**, collaboration with Yong Lu
- 28.02.–15.03.2024 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska and Piotr Gwiazda
- 13.11.–01.12.2023 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska and Piotr Gwiazda
- 21.04.–28.04.2023 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska
- 30.01.–03.02.2023 **University of Hradec Králové**, collaboration with Andrii Khrabustovskyi
- 16.01.–20.01.2023 **WIAS Berlin**, collaboration with Thomas Eiter
- 07.11.–11.11.2022 **IMJ-PRG, Université Paris Cité**, collaboration with Richard Höfer
- 06.09.–09.09.2021 **Czech Academy of Sciences, Praha**, collaboration with Peter Bella and Eduard Feireisl

Publications and Preprints

Research interests

partial differential equations, homogenization of Navier–Stokes and Navier–Stokes–Fourier equations, singular limits, fluid–structure interaction, collision problems

Publications

- Collision/No-collision results of a solid body with its container in a 3D compressible viscous fluid (2025)**
Bumja Jin, Šárka Nečasová, Florian Oschmann, and Arnab Roy; published in “Journal of Differential Equations”; <https://doi.org/10.1016/j.jde.2025.01.057>
- A collision result for both non-Newtonian and heat conducting Newtonian compressible fluids (2024)**
Šárka Nečasová and Florian Oschmann; published in “Proceedings of the Royal Society of Edinburgh Section A: Mathematics”; <https://doi.org/10.1017/prm.2024.5>
- On two Kuznetsov’s conjectures (2023)**
Florian Oschmann; published in “Examples and Counterexamples”; <https://doi.org/10.1016/j.exco.2023.100127>
- Homogenization of the unsteady compressible Navier-Stokes equations for adiabatic exponent $\gamma > 3$ (2023)**

Florian Oschmann and Milan Pokorný; published in “Journal of Differential Equations”; <https://doi.org/10.1016/j.jde.2023.08.040>

5. **Γ -convergence for nearly incompressible fluids (2023)**
Peter Bella, Eduard Feireisl, and Florian Oschmann; published in “Journal of Mathematical Physics”; <https://doi.org/10.1063/5.0138650>
6. **Rigorous Derivation of the Oberbeck-Boussinesq Approximation Revealing Unexpected Term (2023)**
Peter Bella, Eduard Feireisl, and Florian Oschmann; published in “Communications in Mathematical Physics”; <https://doi.org/10.1007/s00220-023-04823-5>
7. **Homogenization of the two-dimensional evolutionary compressible Navier-Stokes equations (2023)**
Šárka Nečasová and Florian Oschmann; published in “Calculus of Variations and Partial Differential Equations”; <https://doi.org/10.1007/s00526-023-02526-2>
8. **On the incompressible limit of a strongly stratified heat conducting fluid (2023)**
Danica Basarić, Peter Bella, Eduard Feireisl, Florian Oschmann, and Edriss S. Titi; published in “Journal of Mathematical Fluid Mechanics”; <https://doi.org/10.1007/s00021-023-00791-x>
9. **Inverse of Divergence and Homogenization of Compressible Navier–Stokes Equations in Randomly Perforated Domains (2023)**
Peter Bella and Florian Oschmann; published in “Archive for Rational Mechanics and Analysis”; <https://doi.org/10.1007/s00205-023-01847-y>
10. **Homogenization of compressible fluids in perforated domains (2022)**
Florian Oschmann (PhD thesis) <http://dx.doi.org/10.17877/DE290R-22795>
11. **Homogenization and low Mach number limit of compressible Navier-Stokes equations in critically perforated domains (2022)**
Peter Bella and Florian Oschmann; published in “Journal of Mathematical Fluid Mechanics”; <https://doi.org/10.1007/s00021-022-00707-1>
12. **Homogenization of the full compressible Navier-Stokes-Fourier system in randomly perforated domains (2022)**
Florian Oschmann; published in “Journal of Mathematical Fluid Mechanics”; <https://doi.org/10.1007/s00021-022-00679-2>

Preprints

1. **Brinkman’s law as Γ -limit of compressible low Mach Navier-Stokes equations and application to randomly perforated domains (2025)**
Peter Bella, Friederike Lemming, Roberta Marziani, and Florian Oschmann; <https://arxiv.org/abs/2505.11213>
2. **Rigorous derivation of magneto-Oberbeck-Boussinesq approximation with non-local temperature term (2025)**
Piotr Gwiazda, Florian Oschmann, and Aneta Wróblewska-Kamińska; <https://arxiv.org/abs/2504.13525>
3. **Qualitative derivation of a density dependent incompressible Darcy law (2025)**
Danica Basarić, Florian Oschmann, and Jiaojiao Pan; <https://arxiv.org/abs/2502.14602>
4. **To collide, or not to collide, that is the question - a survey (2024)**
Florian Oschmann; lecture notes; <https://arxiv.org/abs/2408.00010>
5. **Qualitative/quantitative homogenization of some non-Newtonian flows in perforated domains (2024)**
Yong Lu and Florian Oschmann; <https://arxiv.org/abs/2406.17406>
6. **Quantitative homogenization of the compressible Navier-Stokes equations towards Darcy’s law (2024)**
Richard M. Höfer, Šárka Nečasová, and Florian Oschmann; accepted in “Annales de l’Institut Henri

Poincaré, Analyse Non Linéaire” ; <https://arxiv.org/abs/2403.12616>

Prague, June 16, 2025