

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
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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

- 25.08.–29.08.2025 Summer School “Rotation and Fluids” (Praha, Czech republic)
- 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

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

- 04.2024 **Darcy's law for inhomogeneous incompressible flows**, GAMM25, Poznań University of Technology, Poznań
- 21.01.2024 **Quantitative derivation of Darcy's law for fluids of Carreau-Yasuda type**, Hefei University of Technology, Hefei
- 14.01.2024 **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**, *MFM-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

1. **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>
2. **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>
3. **On two Kuznetsov’s conjectures (2023)**
Florian Oschmann; published in “Examples and Counterexamples”; <https://doi.org/10.1016/j.exco.2023.100127>
4. **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. **To collide, or not to collide, that is the question - a survey (2024)**
Florian Oschmann; lecture notes; <https://arxiv.org/abs/2408.00010>
2. **Qualitative/quantitative homogenization of some non-Newtonian flows in perforated domains (2024)**
Yong Lu and Florian Oschmann; submitted to “Mathematische Annalen”; <https://arxiv.org/abs/2406.17406>
3. **Quantitative homogenization of the compressible Navier-Stokes equations towards Darcy’s law (2024)**
Richard M. Höfer, Šárka Nečasová, and Florian Oschmann; submitted to “Annales de l’Institut Henri Poincaré, Analyse Non Linéaire” ; <https://arxiv.org/abs/2403.12616>

Prague, February 4, 2025